

THE EFFECT OF VEILING GLARE ON APPARENT SIZE RELATIONS

BY T. MURRAY MARTIN AND R. W. PICKFORD

From the Psychological Laboratory, Glasgow University

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I. INTRODUCTION

If two precisely similar disks are placed upright before a subject, side by side, at the same distance from him, they look the same size. If one of them is now moved away from him in the line of vision, it usually begins to look smaller. The rate of decrease in its apparent size, however, is less than would be expected if apparent size were to follow the law of inverse squares. Thouless has used the expression "phenomenal regression to the real size", for the tendency of the subject to see the two disks more nearly the same size than the inverse square law would predict (3). Koffka gives an important account of the different aspects of this problem (2), and Miss Vernon mentions most of the relevant literature and gives an interesting discussion of it (4).

Under fog conditions the 'articulation' of the field of vision is reduced in varying degrees, and it would then be expected that the change in apparent size would more nearly follow the inverse square law than in normal vision. An approximation to fog conditions may be made by placing before the subject's eye a piece of plate glass at an angle of 45° to the line of vision, by which diffused light is reflected into the eye. The intensity of the diffused light is then inversely proportional to the square of the distance of the light source from the diffusing screen. This diffused light makes a veiling glare, much like the glare produced by a fog, when the subject looks into it.

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In the present experiment the questions were asked, whether the effects of articulation of the visual field could be cut out progressively by first reducing binocular to monocular vision and then increasing veiling glare produced in the way described above, and what effects these steps would have on the relative apparent sizes of two disks at different distances. The experimenters were forced to ask also whether the instructions, to make the two disks look the same size, had the same meaning for all subjects.

II. METHOD

An apparatus was set up (Fig. 1) such that on two small white screens at different distances from the eye circular 'disks of light' could be projected, that on the nearer screen being of variable diameter, and that

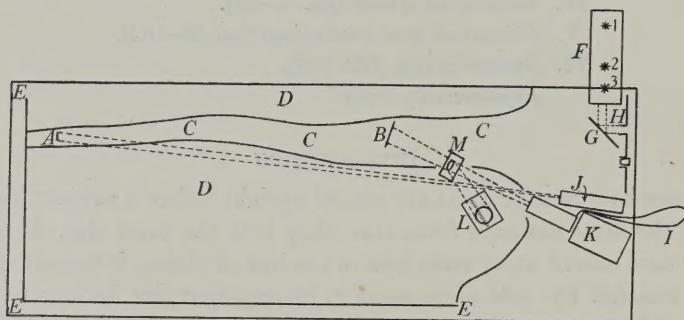


Fig. 1. *A*, standard disk; *B*, variable disk; *CC*, roadway; *D*, black cloth; *EE*, black screen; *F*, lamp-holder giving three positions (1, 2, 3) of lamp for glare; *G*, plate glass partial reflector; *H*, screen with two eye-holes, right temporarily blocked; *I*, loop of cord for subject's control of lantern diaphragm; *J*, spot-light for constant disk; *K*, lantern with variable diaphragm immediately in front of condensing lens; *L*, frosted glass plate with scale; *M*, plate glass partial reflector.

on the farther screen being of fixed size. The variable disk of light was produced by a diaphragm, placed in the lantern, the size of which could be varied by the subject's manipulating a loop of string. The screens were so mounted that the disks of light appeared at different distances along a white 'roadway', which gave an exaggerated perspective effect. This roadway was bordered by black cloth and the farther disk was seen against a black back-cloth. The roadway was illuminated by a 40 W. lamp mounted about 6 ft. above it. The roadway and the disks could be viewed through short black eye-tubes in one of which could be produced glare of varying intensity. The experimenter was able to read the size of the variable disk to half a millimetre, for in the beam of light giving the

disk was placed a small glass plate which reflected an image on to a piece of frosted glass carrying a scale. When the image on the frosted glass plate was in focus, its size was necessarily the same as that of the variable disk, also in focus, seen by the subject. Three intensities of veiling-glare were used, G_1 , G_2 , G_3 , such that $G_3 - G_2$ was approximately equal to $G_2 - G_1$, and G_3 was of such a magnitude that only the disks of light could be seen through it.

The subject, in accordance with instructions to be mentioned below, made adjustments of equality under the three veiling glare conditions. In addition he made similar adjustments with no glare both monocularly (*N.G.m.*) and binocularly (*N.G.b.*). The amount of adjustment necessary, and its direction, were varied by the experimenter from reading to reading in the usual way. The series of conditions for one complete set of readings was G_1 , G_2 , G_3 , *N.G.m.*, *N.G.b.*, in that order, and ten settings were taken for each of these conditions. One or more sets of readings were made by each subject in a day's sitting, as convenient, after a preliminary practice set.

The instructions given to the subject in the preliminary practice set were: "Adjust the size of the nearer disk until in your opinion it looks the same size as the farther disk." After this set of observations had been made by each subject he was asked to describe the method used to equate the apparent sizes of the disks under the five different conditions. It was found that the subjects were using different methods even though the same instructions were given to them all. Of the seven subjects taking part in the experiment, Subjects III and V assumed that it was necessary to think of the disks as if in the same plane, while the other subjects assumed that the disks were to be compared as if in different planes. The experimenters had intended to see how far the progressive reduction of 'articulation' of the field of vision would affect the actual sizes of the disks when appearing the same size at different distances. Now it became necessary also to study the different responses of the subjects to the same instructions. Five subjects were able to do the experiment with modified instructions, trying now to think of the disks in whichever way was the reverse of their previous method. The other two subjects were not accessible long enough for this to be done.

III. STATISTICAL RESULTS

Table I shows the numerical results for the five subjects who did both forms of the experiment. Subjects I, II and IV assumed that to make the disks look the same size meant seeing them as if at different distances.

Table I

Con- dition	Exp. I 'Same planes'					Exp. II 'Different planes'					Diff. of Exps. I and II	
	No.	Mean	S.E.	Diff.	S.E.*	No.	Mean	S.E.	Diff.	S.E.*	Diff.	S.E.*
SUBJECT I												
	(Done first)					(Done second)						
<i>N.G.b.</i>	30	18.3	0.19			50	14.9	0.11			3.4	0.22
				2.7	0.31				2.0	0.17		
<i>N.G.m.</i>	30	15.6	0.24			50	12.9	0.13			2.7	0.28
				2.8	0.29				1.7	0.17		
G_1	30	12.8	0.16			50	11.2	0.11			1.6	0.17
				2.1	0.21				1.5	0.16		
G_2	30	10.7	0.14			50	9.7	0.12			1.0	0.15
				2.2	0.16				1.5	0.14		
G_3	30	8.5	0.09			50	8.2	0.08			0.3	0.12
SUBJECT II												
	(Done first)					(Done second)						
<i>N.G.b.</i>	30	20.1	0.14			50	17.4	0.10			2.7	0.17
				1.5	0.24				1.6	0.16		
<i>N.G.m.</i>	30	18.6	0.19			50	15.8	0.12			2.8	0.22
				4.6	0.25				2.5	0.16		
G_1	30	14.0	0.16			50	13.3	0.10			0.7	0.19
				1.9	0.25				1.0	0.17		
G_2	30	12.1	0.19			50	12.3	0.13			-0.2	0.23
				2.5	0.26				4.0	0.23		
G_3	30	9.6	0.18			50	8.3	0.19			1.3	0.26
SUBJECT III												
	(Done second)					(Done first)						
<i>N.G.b.</i>	30	12.3	0.10			50	11.0	0.07			1.3	0.12
				1.4	0.12				1.1	0.09		
<i>N.G.m.</i>	30	10.9	0.02			50	9.9	0.06			1.0	0.06
				0.2	0.12				0.2	0.12		
G_1	30	10.7	0.10			50	9.7	0.10			1.0	0.14
				0.4	0.15				0.6	0.12		
G_2	30	10.3	0.11			50	9.1	0.06			1.2	0.12
				1.6	0.13				0.8	0.10		
G_3	30	8.7	0.07			50	8.3	0.08			0.4	0.12
SUBJECT IV												
	(Done first)					(Done second)						
<i>N.G.b.</i>	50	13.8	0.07			50	11.3	0.10			2.5	0.12
				1.3	0.11				0.7	0.13		
<i>N.G.m.</i>	50	12.5	0.09			50	10.6	0.09			1.9	0.13
				0.6	0.13				0.3	0.10		
G_1	50	11.9	0.10			50	10.3	0.05			1.6	0.11
				0.1	0.16				0.5	0.09		
G_2	50	11.8	0.12			50	9.8	0.08			2.0	0.13
				2.0	0.13				0.8	0.13		
G_3	50	9.8	0.06			50	9.0	0.10			0.8	0.12
SUBJECT V												
	(Done second)					(Done first)						
<i>N.G.b.</i>	20	15.8	0.11			50	15.0	0.14			0.8	0.24
				2.1	0.15				1.8	0.21		
<i>N.G.m.</i>	20	13.7	0.10			50	13.2	0.16			0.5	0.26
				0.1	0.18				0.2	0.23		
G_1	20	13.6	0.15			50	13.0	0.16			0.6	0.27
				1.7	0.18				0.9	0.21		
G_2	20	11.9	0.09			50	12.1	0.14			-0.2	0.24
				2.1	0.17				1.8	0.18		
G_3	20	9.8	0.15			50	10.3	0.12			-0.5	0.20

* The S.E.'s for Subject V were estimated by Fisher's method for differences between small samples(1).

They did Exp. I first and II second. Subjects III and V did Exp. II first, because they assumed that the disks would have to be thought of in the same plane, and Exp. I second. The various mean readings for the numbers of observations shown are given in millimetres, together with their standard errors. All these means are statistically significant. It will be seen that the highest values of the variable for these five subjects are with binocular vision and no glare. The standard was 18 mm. in diameter and at a distance of 3 m. from the subject's eye. The variable was at 1.34 m. The highest mean value of the variable, if we leave out Subject VII, who will be considered later, was 20.1 mm., given by Subject II (*N.G.b.*; Exp. I). The lowest mean value was 8.2 mm., given by Subject I (G_3 ; Exp. II) (see Fig. 2), and is very near the size expected according to the law of inverse squares (8.04 mm.). The differences between the mean values of the variable under the five conditions of vision, with and without veiling glare, are also shown, with their standard errors. Thirty-five out of the forty differences may be taken as significant. For all five subjects the change from *N.G.b.*, which is normal vision, to G_3 , in which distance cues are completely cut out, means a reduction in the size of the variable which is chosen as the same as the standard, more and more approaching the size expected on the inverse square law.

This table also shows the differences in the mean values of the variables obtained under the same conditions of vision but by the different methods of Exps. I and II. These differences are all significant, excepting those of Subjects II and V under the condition G_2 , both of which are reversals, and of Subject V under *N.G.m.* Of the other results of Subject V under glare, one is doubtful and the other is a reversal. Where the results are statistically significant, it is concluded that the change in the subject's method of working had a measurable effect. It is of interest that all differences under normal binocular vision are significant, and that the magnitudes of the differences decrease, on the whole, from *N.G.b.* towards G_3 . This would be expected, because the less distance cues operate the easier will it be to think of constant and variable disks as if in the same plane.

Table II shows the results for Subjects VI and VII, who were not able to do the experiment with modified instructions. Although Subject VI did only ten readings under each condition, her results support the general conclusions, but show one reversal. Subject VII, however, gave very remarkable results. For him there is a significant difference between the mean readings for *N.G.b.* and *N.G.m.*, and in the usual direction, but the

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differences between the mean readings under the three degrees of veiling glare are not significant. The difference between *N.G.m.* and G_1 are sig-

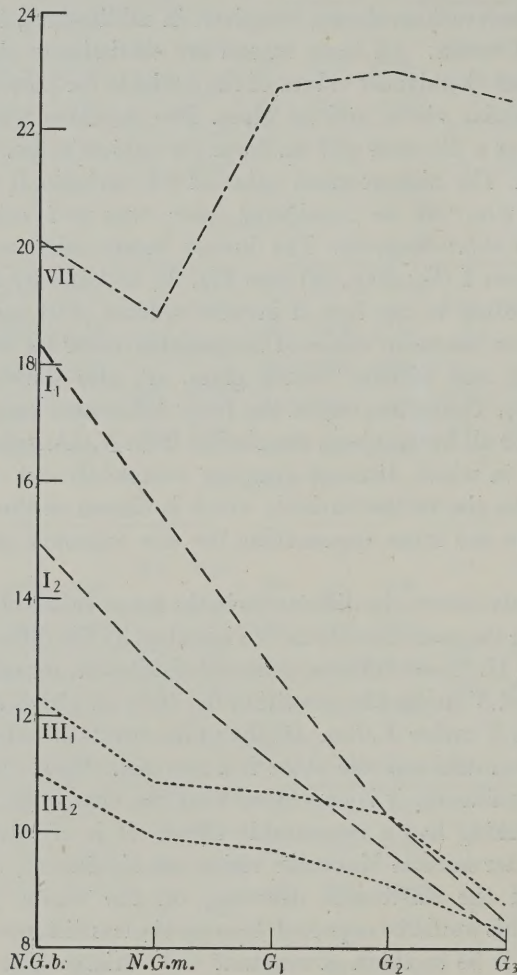


Fig. 2. Results for Subject I, Exps. I and II; Subject III, Exps. I and II; and for Subject VII. The distances between *N.G.b.* and *N.G.m.* are not mathematically meaningful, but those between G_1 , G_2 , and G_3 are approximately proportional to the corresponding changes in intensity of glare.

nificant, but reversed: he has given a greater value to the variable—already very large—when veiling glare was present, and the same value whatever the glare. This suggests that for him the distant disk looked

slightly larger under glare and not relatively smaller as for the other subjects.

Table II. *Subjects VI and VII*

Con- dition	Subject VI					Subject VII				
	No.	Mean	S.E.	Diff.	S.E.*	No.	Mean	S.E.	Diff.	S.E.*
<i>N.G.b.</i>	10	15.0	0.18			30	21.0	0.30		
				3.0	0.19				2.2	0.47
<i>N.G.m.</i>	10	12.0	0.05			30	18.8	0.36		
				-0.5	0.13				-3.9	0.50
G_1	10	12.5	0.12			30	22.7	0.34		
				1.5	0.23				-0.3	0.51
G_2	10	11.0	0.20			30	23.0	0.37		
				1.5	0.47				0.5	0.65
G_3	10	9.5	0.43			30	22.5	0.53		

* Estimated S.E.'s by Fisher's method for differences between small samples(1).

IV. DESCRIPTIVE RESULTS

It is important to consider the methods of the subjects more carefully, because of the possible assumption that the request to make the two disks look the same size can have only one meaning. Subjects I, II and IV realized that this experiment was on apparent size relations at different distances, and took no steps which might weaken the influence of apparent distance. Of these Subjects I and IV were fully aware of the psychological implications of the experiment and Subject II was moderately acquainted with them.

Subject I could easily distinguish two methods of equating the disks which gave, in preliminary experiments, different results: (1) Equating by what he called the "Total response method". "This can only be described as responding to the 'size-in-its-setting' of the further disk, and then transferring this to the nearer disk, and trying to fit the second situation 'as a whole' to the first." Those who have taken part in experiments on size or brightness 'constancy' will realize what is meant by this statement. (2) "Method of reduction to the same plane." Here the result was different according to whether the two disks were imagined to be in the plane of the nearer or of the farther disk. No doubt two results could be got by the first method if 'one-way' comparison were used instead of rapid alternation from one disk to the other. If this is so, then the result got by this method may be a mean of the two modes of one-way comparison. "In my experiments", he said, "I used method 1 above, and the first part of method 2, reducing to the plane of the nearer disk." Subject I has shown a high phenomenal regression in previous experiments.

For Subject IV equalizing the disks was a considerable problem in binocular vision without glare. He appears to have had the least degree of phenomenal regression of the three. For him the expression, "Look the same size", was almost without meaning in *N.G.b.* "The disks did not look the same size at all." Each was a "disk-of-a-certain-size-and-distance". "It was necessary to make the near disk such a size that it would look the same size as the distant disk if it were at the same distance." Expressed verbally, this process, which is rapid and immediate in character, seems absurdly round-about. With the reduction of distance effects, as the glare increased, the difficulty decreased, and the process became direct comparison. At the same time, however, the disks seemed less and less to "have distance" at all, and in G_3 they were simply like moons in a misty sky, just as far or as near as he liked to imagine. This subject also had difficulty with Exp. II, because he was much affected by the combination, "size-at-a-certain-distance", and, in order to think of the disks as if at the same distance, he had to imagine that the 'roadway' curled back upon itself and became a sort of overhanging arm which held the constant disk at the same distance as the variable. When this visual interpretation is not maintained, the constant disk "suddenly changes and becomes larger".

Subjects III and V assumed that to make the disks look the same size, as instructed, they would have to think of them as if in the same plane. Subject III was familiar with the problem of phenomenal regression, but simply took it for granted that her interpretation of the instructions was correct. In Exp. II (which she did first) "the variable was adjusted by looking rapidly from variable to constant and not allowing constant to fit into its proper surroundings and distance, i.e. by attempting to focus on constant as though it were at the same distance as variable. If one did allow constant to sink into its proper environment and distance then it appeared to expand and stand out in its distant position", and this gave the adjustment for Exp. I, "where attention was concentrated on constant which was focussed at its proper distance in its surroundings and variable was adjusted then to this size—occasionally constant appeared to recede into the remote distance and then it seemed to become much smaller". In Exp. I (done second) she explained the following points: "Sometimes far one recedes into distance and looks smaller—keep them about same distance"; "Vaguer to do this than other experiment"; "In other, aiming at something definite though more difficult"; "Gaze at standard and get idea of it with its distance; then try and make this one same size—look back to check up"; "Not merely comparison of two as in

other experiment"; "Combination of size it is and distance it is." Subject V was not familiar with the psychological meaning of the experiments. He pointed out, however, in Exp. II, which he did first, that it is "Funny without glare—move eyes backwards and forwards; with glare both look in the same plane".

Subject VII, who chose a slightly larger variable under the veiling glare than in normal vision, reported that it was "Easier under glare". "Glare on nearer one gives wrong impression of size—making it a lot larger than it really is. At times I was judging them to be the same size but I was aware I was wrong with the near one—the glare was making them the same size. I had impression that glare increased size of near disk from reality. This would have led me to make it smaller than it ought to be. I watched against that and tried to judge them just as they appeared." For him there seem to be two possibilities: he might make them the same size according to what he calls 'reality', and then they would be as near as possible the same diameter, appearances altogether apart; or he might 'judge' them to appear the same size whatever their 'real' diameters might be. Under glare he continued to act upon appearances, as instructed, though he was aware of being "wrong with the near one".

V. DISCUSSION AND CONCLUSIONS

(1) It is not desirable to draw sweeping conclusions from a small experiment, but several points of great interest arise here. The numerical results show that under veiling glare there is approximation to the inverse square law for apparent size relations of objects seen at different distances. In this experiment the brightness relations under different conditions of glare, which might be affected in fog vision, were kept constant; the disks were always of the same apparent brightness. The articulation of the visual field is reduced by glare and the problem of making the two disks 'look' the same size is more like direct comparison of objects at the same distance. It would be reasonable to expect that in motoring under fog conditions phenomenal regression is reduced. Anyone with a strong phenomenal regression, who had no difficulty in seeing correctly that his car would pass through a given gap many yards ahead, might make serious mistakes in a fog, even when he felt fairly confident. This requires to be tested out under everyday conditions. It should be remembered that persons are accustomed to see for everyday purposes by the modes of vision that they actually use, whatever these may be, and that a man who had low phenomenal regression might be as well able to see size

relations under normal vision as a man with high regression, but would be far less disturbed in a fog. In view of this it is interesting that Subject IV, who had low phenomenal regression, reported that he had been surprised sometimes at shooting a rabbit running in the misty twilight, when he thought the bad conditions of vision would have made aiming almost impossible. Probably a person with very high phenomenal regression would have been much more disturbed by the reduced distance effects and quite unable to hit the mark.

Neither of these applications of the results of the experiment would hold for any person who saw the distant disk larger under veiling glare, and of relatively constant size whatever the glare. Subject VII appeared to compensate for the effects of glare, and would, presumably, see objects at a given distance slightly larger under fog conditions, however bad the fog. It is interesting to recall that the order of experimental procedure placed normal binocular vision last, and it is difficult to see how his compensation could have been made on conscious knowledge of the 'real' size of the standard. According to his own account, however, he could have worked on the basis of 'real' rather than 'apparent' sizes, and then would have chosen a smaller variable. It is very interesting to notice that the other subjects did not make such a sharp distinction between 'appearance' and 'reality', because they chose, on the ground of 'appearance', the size this subject would possibly have chosen on the ground of 'reality'. It is also very unfortunate that the experiment could not be continued at the time with him, to see what size he would indeed choose on the ground of 'reality'.

In general the results suggest that considerable individual differences must be expected in a large population. These differences might be important in testing motor drivers, air pilots and other people who had to take account of size relations in fog.

It should be pointed out that in fog people commonly observe that objects which can be seen look unexpectedly large, and this is due to the increase in their apparent distance. The numerical results for Subjects I-VI do not accord with this observation, but those of Subject VII accord with it completely. The whole matter obviously needs fuller investigation. Artists habitually use clearness of outline and presence of detail to make objects which they draw look near, and if they wish to make an object in the foreground specially unobtrusive, they take care that it does not have a clear outline or much detail of structure. It is probable that, in normal vision, sharpness of detail and of outline are important factors in determining apparent distance, but, in this experiment, the disks had no

detail of visual structure at any time, and the veiling glare did not make the outline of the distant disk more blurred than of the near disk, as it would have been in a fog. Another interesting point is that very short preliminary observations on another subject have indicated no change whatever in phenomenal regression, when illumination was decreased until disks at different distances and not illuminated by special spot-lights, were almost invisible. When this is done the outline of the distant disk does become much more blurred than that of the near disk.

(2) Turning to the question of experimental instructions, it might be surprising to some people that two subjects thought they ought to try to reduce the articulation of the visual field for themselves. It is, however, not so surprising as it seems, because to these subjects the assumption was reasonable that the two disks would be more satisfactorily made to 'look' the same size if thought of in the same plane. Indeed, they both found direct comparison difficult when the disks did not seem in the same plane, and adopted what seemed to them the best solution of the problem, to make the two disks look the same size.

The three subjects who did nothing to weaken the influence of distance cues, as it happens, were interested in the meaning of the experiment. They all spontaneously adopted what might be called the 'proper' attitude. The question of what attitudes are adopted in solving the problem of equalizing apparent sizes of similar disks seen at different distances is of great psychological interest. It is sometimes assumed that any instructions which tend to set up an 'analytic' attitude are psychologically illegitimate, and that the 'natural' attitude is satisfactorily set up by asking the subject simply to make the disks 'look' the same size. The present experiment shows that such instructions may set up the attitude thought proper to the experiment by the subject in question, and what one person may think proper another may not. More explicit instructions are required, and, indeed, they should probably be adapted to each individual subject. In other words, quantitative results, even though statistically significant, may be psychologically meaningless unless accompanied by adequate statements or remarks by the subjects, or unless the instructions have been carefully adapted to each subject and we know what they were. It is, indeed, most unlikely that psychology can become an exclusively quantitative science. This is important, because in psychology we always have to take account of the living—and often of the conscious—organism, and to consider all aspects of its response under given conditions. It is therefore well to think of psychology as a biological and not as a physical science.

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A final word concerns the meaning of the words 'look the same'. These words have no absolute meaning, even in the setting of a standardized experiment. Their meaning is relative to the subject's idea of the situation in which he is placed. Two very different sizes of variable disk may both 'look' the same as the standard, if different interpretations are made of the situation. Under normal conditions, moreover, it may be doubtful, sometimes, whether two disks at different distances can be said strictly to 'look' the same at all. The subject may have to make an estimate of the size of one disk which would 'look' the same as the size of the other if it were at the same distance, without ever truly seeing them the same.

VI. SUMMARY

1. An experiment was done in which the sizes of two similar disks, one 18 mm. diameter, at 300 cm. distance, and the other variable in diameter, at 134 cm. distance, were equalized by the subject, in normal binocular vision, in normal monocular vision, and in monocular vision in three degrees of veiling glare. The strongest glare cut out all visual distance cues. It was found that, as distance cues are gradually cut out and glare increases, the apparent size relations of the two disks more and more nearly approach and finally almost reach what would be expected on the law of inverse squares. This reduction of phenomenal regression under veiling glare might be of interest in relation to motor driving and flying in fog. The experiment indicates that large individual differences in this reduction are to be found.

2. Three subjects assumed that the instructions, to make the two disks look the same size, meant thinking of the disks as if at different distances, but two subjects assumed that they would have to think of the disks as if in the same plane. Two other subjects were not available long enough to use more than one method, but the five mentioned repeated the experiment reversing the methods used at first. There was a large proportion of significant differences in the mean readings by the two methods. This suggests that it is not sufficient to assume that simple instructions are always interpreted in the way the experimenter expects. The subject responds in the way fitting for the conditions and instructions as he understands them. It is also possible that some subjects may doubt that two disks at different distances can 'look' strictly the same size in normal vision at all.

Our thanks are due to the subjects of the experiment, to Dr R. H. Thouless for his advice and criticism, and to Mr J. F. Simpson.

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EXPERIMENTS ON THE CONSTANCY OF SHAPE

BY W. E. MOORE

From the Psychological Laboratory, University of Manchester

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 - (1) *Aim of the experiments* (pp. 106–107).
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I. INTRODUCTION

It has been stated by Boring⁽¹⁾ that in many ways the problems of perception have always been central in systematic psychology. It is certain that the differences, or lack of correspondence, between perceptual awareness on the one hand, and either sensory stimulation or physical reality on the other, have always been the central problems of perception. And in recent years, the Gestalt psychologists have introduced these problems extensively into the experimental laboratory. A mass of data has been accumulated covering countless manifestations of this discrepancy between perceptual awareness and the pattern of sensory stimulation. One of the most readily measurable of these manifestations is that referred to as constancy of shape, or phenomenal regression to the real shape. If an object is tilted at an angle to the line of vision of the observer, the phenomenal, or seen, shape of that object is intermediate between the shape of the retinal stimulation and the real, or physical, shape of that object.

The most extensive investigations of this constancy of shape have been those of Thouless^(6,7,8), and Brunswik's co-workers, Eissler and Klimpfinger^(3,4). All the workers have observed that the amount of constancy in any instance depends upon the presence of factors conducive to good depth perception, for example, binocular vision, good lighting,

and so forth; and all the workers have observed considerable individual differences.

Thouless has come to the conclusion that the phenomenon is to be explained by the presence of spatial clues which, so to speak, "give information" as to the real shape of the object, and thus cause a compromise to be made between this and the retinal shape.

Brunswik's own interpretation⁽²⁾ of the results is similar to that of Thouless, but is more extensively worked out. In the perception of a non-normally oriented object he asserts that the subject is making a compromise between tendencies to react to each of two 'poles' (to use Prof. Tolman's translation). One pole is the *real* shape of the object and the other is the *retinal* shape. This tendency to compromise between poles is regarded as general in the perceptual field, and indeed in the whole of the psychology of judgement. For example, in judging a person's intelligence, the person's actual capacity may form one pole, but other poles, such as personal appearance, may also be present, and have a considerable influence on the judgement. It is partly this generalization of his results by Brunswik that has helped to bring constancy problems directly into the focus of psychological research.

A quite different and highly elaborate theory of the constancy of shape has been built up by Koffka⁽⁵⁾, and is largely based on one of Eissler's results, namely that the constancy appears to be different for differently shaped objects. Briefly, Koffka's explanation of the phenomena of constancy of shape rests upon two assumptions:

(1) That the frontal vertical plane is the most stable of all planes, and any surface not in that plane will tend to regress (phenomenally) towards it.

(2) Some objects have more highly organized, or more 'stable' shapes than others, and hence there will be a tendency for any object to regress to a more highly organized shape.

Suppose, then, we have a circular object, seen in section *XY* (Fig. 1) tilted from the frontal vertical plane of an observer *O*. Then, according to Koffka's explanation, there will be two sets of 'forces' acting on the ellipse that is seen at *O*.

(1) Those tending to render it phenomenally more nearly in the frontal vertical plane.

(2) Those tending to render it more circular (as the circle is a very highly organized form).

These 'forces' are referred to as *internal organizing forces*. They are both opposed by the *external organizing forces* set up by the actual dis-

tribution of retinal stimulation. The result is thus the compromise so characteristic of constancy phenomena. Both types of internal organizing forces tend to produce the circular form, the first by reducing the apparent tilt of the object, and the second by a sort of expansion of the elliptical form itself. The external forces set up by retinal stimulation tend to make the object be seen retinally, and interact with the internal forces producing the observed compromise. This explanation would account for

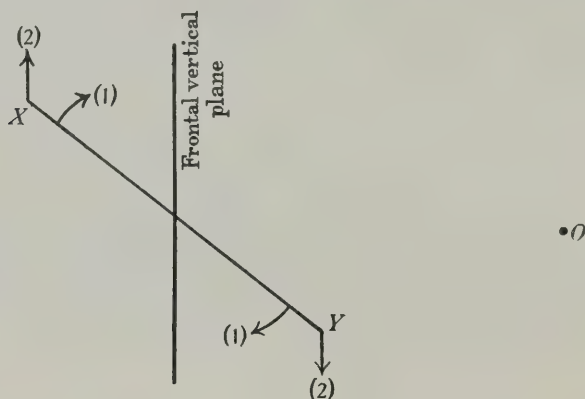


Fig. 1.

Eissler's result concerning the different constancy for different shapes, by the fact that the internal organizing forces of the second kind would be different in the two cases, depending on the real (physical) shapes of the respective objects.

The experiments reported in this paper were designed to test this theory, the general plan being to measure the constancy of shape for two different figures; if any difference in constancy exists, it must be traced to its source, making sure that it is not due to factors such as difference in area, before ascribing it to the cause suggested by Koffka.

II. METHOD OF EXPERIMENT

(1) *Aim of the experiments*

The figures investigated were the straight line and the circle. As no particular length of line is regarded by Gestalt psychologists as more highly organized than another, whereas a circle is regarded as more highly organized than an ellipse, then if internal organizing forces do play a part, a greater degree of constancy ought to be shown by a tilted circle than a tilted line.

This was the question it was decided to test. Briefly the plan of attack was as follows:

(1) Measure the phenomenal length of a straight line, tilted from the frontal vertical plane to various angles of tilt, by comparison with shorter lines.

(2) Ditto, for a tilted circle, by comparison with ellipses.

If any difference in constancy is found, it will be necessary to perform experiments to determine whether it is actually due to the working of such organizing forces, or to other factors.

(2) *Apparatus*

The stimuli used consisted of vertical lines and ellipses. The lines were constructed of carefully straightened galvanized iron wire, soldered at right angles to horizontal lengths of the same wire which could be mounted at their ends in wooden supports *S* (Fig. 2). The vertical wires *AB* were painted white and the rest dull black.

The ellipses were constructed geometrically on white cardboard, carefully cut out, and for use were firmly fastened to the 'line' framework by means of adhesive tape. Thus the same supporting arrangement could be used for both lines and ellipses. The

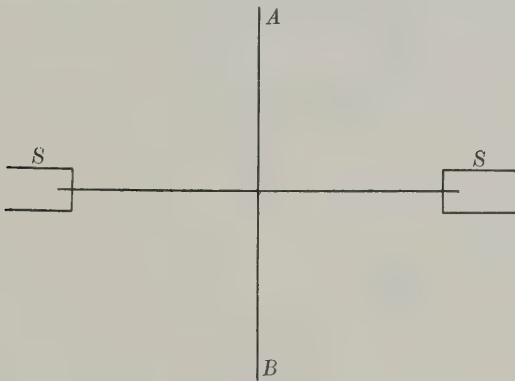


Fig. 2.

arrangement of the stimulus lines (or ellipses, if these were fixed to the lines) in the supporting apparatus is shown in Fig. 3. *X* and *Y* were vertical boards fastened to a heavy base. The upper stimulus line was fastened firmly into its cylindrical wooden supports, which were free to turn in circular holes in *X* and *Y*, and one of which, *S*, was long and projected through the black cloth *b* (Fig. 3) surrounding the whole apparatus, and carried a pointer *p* which indicated on a circular scale *x* the angle at which *AB* was inclined to the vertical. The lower stimulus lines *CD* were removable from their supports which were tightly inserted in *X* and *Y*.

The whole of the apparatus, except the vertical stimulus wires, was painted black.

The subject sat in a low chair (Fig. 4) in front of a black screen *AB* with a chin

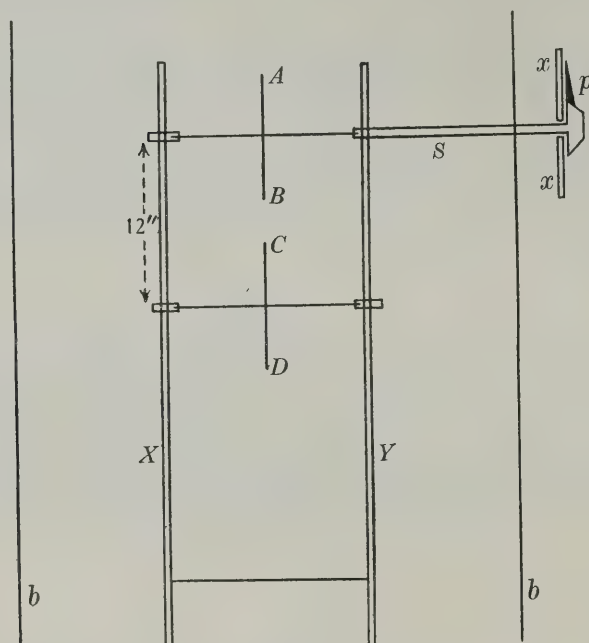


Fig. 3.

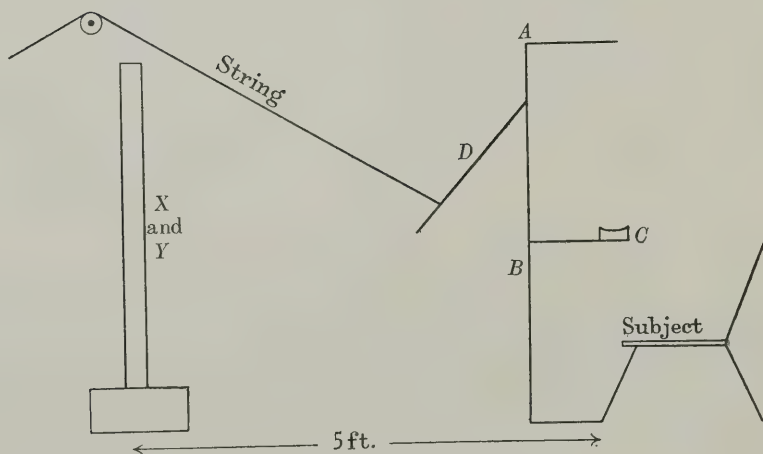


Fig. 4.

rest *C* and a door *D*, covering a rectangular aperture, through which the subject could see the stimulus lines or ellipses and their supports in a frontal vertical plane. The chin rest was at such a height from the floor as to make the eye level of the subject fall midway between the levels of the horizontal supports of the stimulus lines. The chin rest was at a distance of 5 ft. from the plane of the supports *X* and *Y*. The door *D* could be raised and lowered by the experimenter by means of a string. The experimenter's position during the taking of readings was, of course, close to the scale *x* and hidden from the subject by the cloth *b*.

The experimental room was darkened, and the figures were illuminated by a single floodlight placed in front of and below them, and directed towards a point midway between the centres of the two figures. The lamp was of 60 watts, and the light was diffused by passing through three thicknesses of ordinary typing paper. In this way it was found that the figures were as nearly as possible equally illuminated for all angles of tilt of the upper figure.

The upper stimulus line (circle) was 10 in. in length (diameter) and a series of lines less than 10 in. long and ellipses of less than 10 in. vertical axis were constructed for the lower stimulus objects.

III. RESULTS OF THE EXPERIMENTS

The subjects were six graduates and research students of psychology. The subject was instructed to report whether the upper figure appeared longer, equal to, or shorter than the lower when the screen in front of him was raised.

The method was as follows: One of the lines *CD* (Fig. 3) was introduced vertically in its supports. The upper line *AB* was rotated to any multiple of 5° between 0° and 90° in an anti-clockwise direction. The screen *D* was raised, and lowered as soon as the subject had made a judgement. *AB* was then rotated to some other position (multiple of 5°) on the scale and the judgement repeated. This process was continued until a judgement had been obtained for every 5° position on the scale. The positions were presented in random order. The above was repeated for all values of *CD*. After readings had been taken with a few subjects it became unnecessary to continue presenting the whole range of angles of tilt with each value of *CD*, and it was possible to give just five or six positions of *AB* around the 'equality' point.

The procedure was repeated for all subjects with both the tilted line and the tilted circle.

Table I shows a record of judgements of one subject for lines. It indicates the general method of recording judgements. *L* represents a judgement 'longer', *S* for 'shorter' and *E* for 'equal'. From the results as recorded in this table it was possible to read off the angle of tilt of *AB* necessary for it to be phenomenally equal to *CD* for a particular subject.

The difference between this and the angle of tilt necessary for equal retinal projection gave the measure of constancy used in these experiments. This measure will be referred to subsequently as the 'angular compensation'. It is recorded in the final column of Table I.

Average values of this measure of constancy were then calculated for various angles of tilt for both the tilted line and the tilted circle. These values are shown in Table II (upper section). It can be seen that there is a tendency for the constancy of shape to be greater for the circle than for the line, over the explored range. This difference was deemed sufficiently large to warrant further experimentation.

Table I. *Judgement of lines by one subject*

Length of CD in in.	Angle of tilt										Angle of tilt for equality	Angular compen- sation
	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°		
9.65	<i>L</i>	<i>L</i>	<i>L</i>	<i>E</i>	<i>E</i>	<i>S</i>	<i>S</i>	<i>S</i>	.	.	17.5°	2.5°
9.39	.	.	<i>L</i>	<i>L</i>	<i>L</i>	<i>E</i>	<i>S</i>	<i>S</i>	<i>S</i>	.	25.0°	5.0°
9.06	.	.	<i>L</i>	<i>L</i>	<i>L</i>	<i>E</i>	<i>S</i>	<i>S</i>	<i>S</i>	.	25.0°	0.0°
8.66	.	.	.	.	<i>L</i>	<i>L</i>	<i>L</i>	<i>E</i>	<i>S</i>	<i>S</i>	35.0°	5.0°

Table II. *Average values of angular compensation for six subjects*

Type of figure	Angular compensation for angle of tilt						
	15°	20°	25°	30°	35°	40°	45°
Line (10 in.)	0.0	1.0	2.0	3.0	3.9	—	—
Circle (10 in.)	—	7.0	8.0	9.0	10.0	10.0	—
Small circle (4 in.)	—	7.0	7.8	8.5	9.7	11.0	—
Outline circle	—	5.0	7.3	9.1	10.0	10.0	—
Prolate ellipse	—	—	9.2	9.4	9.0	9.0	—
Line (10 in.) (repeated)	2.2	2.5	3.0	3.8	3.8	—	—
Circle (10 in.) (repeated)	—	8.2	9.0	10.0	10.0	11.6	—
Small circles 'separated'	—	5.8	7.5	9.2	10.7	12.2	—
Small circles 'together'	0.8	2.0	2.9	3.7	4.4	—	—

The difference may be dependent upon a number of factors:

(1) Difference in area of the stimuli.

(2) The circle and the ellipses are surfaces, and as such may have different properties from linear figures. For example, it is often stated that differences in brightness between the upper and lower limits of a tilted figure form one of the most important clues which form the basis of constancy phenomena. In the present apparatus slight brightness differences did exist, and it is possible that these were more easily perceptible on the surface figures than on the lines.

(3) Internal organizing forces, which would give a circle a greater tendency to constancy than a straight line.

The following experiments were therefore performed to test for the presence or absence of differences in constancy due to these three factors:

(1) The constancy of shape was measured for a circle of 4 in. diameter. Exactly the same method was used.

(2) The constancy of shape was measured for an 'outline' circle of 10 in. diameter. The stimulus objects were constructed of stiff cardboard (Fig. 5). The outline was $\frac{1}{8}$ in. wide, and the cross pieces were painted dull black. These parts were almost invisible when the figures were placed in the apparatus under experimental conditions, and the impression of 'outline' figures was successfully obtained. The method was exactly as before.

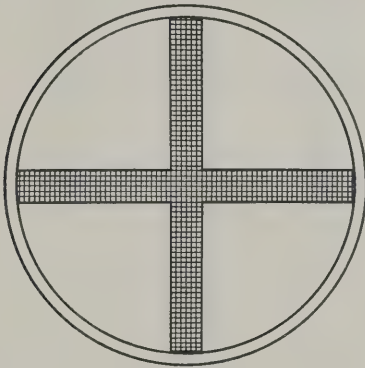


Fig. 5.

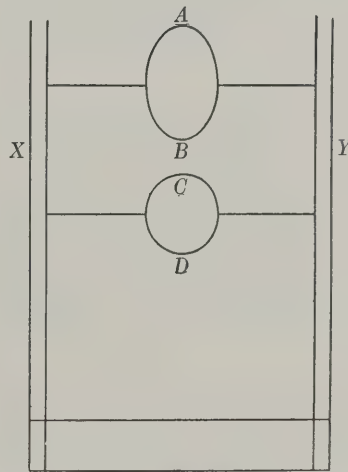


Fig. 6.

(3) The constancy of shape was measured for a series of prolate ellipses. The set-up is shown in Fig. 6. In this case the ellipse was tilted until it appeared circular. If internal organizing forces of the kind postulated by Koffka exist, then, when a prolate ellipse is tilted until it appears circular, these forces should be expected to assist in the production of the circular form; i.e. they would assist the external forces instead of opposing them, as in the case of a circle tilted to appear equal to an oblate ellipse. The constancy in the case of the prolate ellipse would, then, be expected to be less.

The results of these three experiments are shown in the second section of Table II. The values of the angular compensation are in each case not greatly different from those for the original circle. The difference originally

observed between the circle and the line cannot, therefore, be ascribed to any of the three causes suggested above.

Two possibilities, however, still remain:

(1) It is possible that the results of the later experiments had been modified by practice, and that, if the subjects were re-tested for constancy with the original tilted line and circle, the difference between the two would have disappeared.

(2) It is also possible that the subjects might consciously or unconsciously be adopting different subjective methods of comparison in

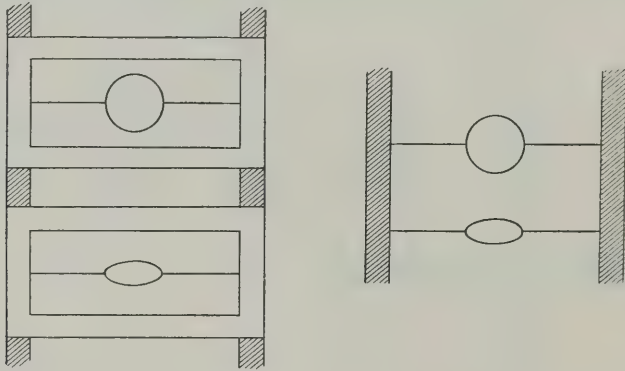


Fig. 7.

the two set-ups, and that this might account for the observed differences in constancy. The following experiments were therefore performed, with a view to testing these two points:

(1) The original measurements with the original line and circle were repeated.

(2) The constancy of shape for the circle of 4 in. diameter was measured in the two set-ups illustrated in Fig. 7. The first of these was designed to encourage a *separative* method of comparing the figures. The second, on the other hand, was expected to call forth a more truly simultaneous method of comparison. These set-ups were chosen more or less at random; any two arrangements likely to encourage different subjective methods of comparison would have served the same purpose.

The results of these two experiments are shown in the lower sections of Table II. From an examination of the figures it can be seen that the effect of practice has been negligible. There is a difference, in constancy, however, between the two set-ups of the second experiment ('separated' and 'together') which is comparable to that originally observed between

the circle and the straight line. These results suggest, then, that a difference in subjective method did play some part in producing the original difference in constancy.

In order to confirm, or otherwise, this tentative conclusion, one further experiment was performed. The subjects were given a week's training in making the comparisons by a definitely separative method. That is to say, they were told to look first at the upper figure, then at the lower, then back at the upper, and then to make a judgement. These instructions were strictly enforced. The set-ups were the original 10 in. circle and ellipse, and the small circle arrangements of the previous experiment, as shown in Fig. 7. At the end of the week's training each subject was given four sittings with each set-up. The average angular compensation before and after the period of training for each set-up is shown in Table III.

Table III. *Average values of angular compensation before and after training in 'separative' method of comparison*

Type of figure	Angular compensation for angle of tilt									
	Before training					After training				
	20°	25°	30°	35°	40°	20°	25°	30°	35°	40°
Line (10 in.)	2.5	3.0	3.8	3.8	—	—	18.0	20.0	21.7	23.0
Circle (10 in.)	8.2	9.0	10.0	10.0	11.6	—	12.0	14.1	16.2	17.1
Circle (4 in.) 'separated'	5.8	7.5	9.2	10.7	12.2	7.0	9.2	11.6	12.2	11.0
Circle (4 in.) 'together'	2.0	2.9	3.7	4.4	—	7.2	9.2	11.4	12.2	10.0

From this table it can be seen that the week's training in using a particular subjective method had very considerably altered the constancy in some of the set-ups. The expectation was that the original differences between the circle and the line, and between the two set-ups of Fig. 7, would have been somewhat diminished. Instead of this the constancy for the line, for example, now appears to be significantly greater than that for the circle, instead of smaller, as previously. Probably the most important factor, however, is that the period of training in one subjective method had unquestionably affected the constancy in two of the set-ups.

The above experiments, and the conclusions suggested by them, have been criticized by Prof. F. C. Bartlett (in a private communication) on the grounds that the horizontal supports of the stimulus objects were not entirely invisible, and that, in reality, the tilted lines were behaving as tilted crosses. An attempt was made to meet this criticism. A new apparatus was constructed in which the horizontal supports were made of

very thin piano wire, painted dull black, which was reported to be invisible by all the subjects under the experimental conditions. The constancy of shape for the original circle and the original line was inmeasured in the modified apparatus. The same subjects were used. The results are shown in Table IV. It can be seen that, although the angular compensation is in general greater than before, the circle still shows greater constancy than the line.

In the case of one subject, however, the reverse was true. His results are shown in the lower part of Table IV, and it can be seen that his constancy in these supplementary experiments is greater for the line than

Table IV. *Values of angular compensation with modified apparatus*

Type of figure	Average angular compensation for five subjects for angle of tilt				
	20°	25°	30°	35°	40°
Circle	—	13·7	15·0	17·6	18·0
Line	9·0	11·0	10·0	6·8	—

Type of figure	Angular compensation for Subject F for angle of tilt						
	25°	30°	35°	40°	45°	50°	55°
Circle	20·0	21·8	23·8	29·0	32·0	35·0	37·5
Line	27·5	30·0	32·5	35·0	37·5	40·0	42·5

for the circle. In the original experiments, this subject's results followed the general trend (i.e. his constancy was greater for the circle). If the main contention of this paper is correct, a reversal of this kind in one subject might be explained by his having adopted a different subjective method or 'set' in the later experiments. On examining the introspective reports of this subject, it is found that in making the circle judgements, he relied in the first series mainly upon a comparison of the curvatures of the edges of the figures, while in the supplementary series he was concerned with comparing the actual visual heights. This may be the explanation of the reversal obtained with this subject.¹

Apart from this subject, the results show that, in the main, a difference in constancy between the tilted circle and the tilted line, similar to that originally found, exists when the supporting wires are completely invisible.

¹ This subject unfortunately left England a few days after taking the later series, and the matter could not be further investigated.

IV. DISCUSSION

It is clear from the small number of subjects and the imperfections of the apparatus that any conclusions which may be drawn from the foregoing experiments must, at best, be accepted as suggestive only. The inferences which are fairly definitely indicated, however, are these:

(1) Other things being equal, a tilted circle will show a greater degree of constancy than a tilted line.

(2) This difference must not be accepted, however, as evidence for the Gestalt theory of constancy described in the introduction, for two reasons:

(a) A tilted prolate ellipse shows quite as much constancy as a tilted circle. This would not be the case if the Gestalt explanation were valid.

(b) The difference in constancy between a tilted line and a tilted circle, although not affected by practice, is clearly affected when the subjects are trained to use a special subjective method in viewing the material.

It is suggested, therefore, that the subjective method, and not internal organizing forces, is largely responsible for the difference.

All these conclusions must be taken as applicable only to the experimental conditions of this research, and only for adult human subjects with no special training in drawing or similar occupation. There is an evident need for research with other groups of subjects.

V. SUMMARY

1. The constancy of shape is appreciably greater for a tilted circle than for a tilted straight line.

2. The difference is not due to the difference in area between the two figures. Nor is it due to the possibility that outline and surface figures have different visual properties.

3. The difference cannot be explained by the difference in the two cases of the internal organizing forces, as postulated by Koffka.

4. The present experiments tend to show that the difference in constancy is to be ascribed to a difference in *subjective method*. The circle and line 'set-ups' seem to encourage respectively different methods of comparison of the standard and test stimulus objects.

5. Additional experiments were performed to meet the criticism that, as the horizontal supports of the vertical lines were visible, these figures

might be behaving as tilted crosses. When these supports were invisible to all the subjects, the circle still exhibited greater constancy than the line.

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(Manuscript received 27 February 1938)

A NOTE ON AN IMPROVED DESIGN OF VOICE KEY

BY D. F. VINCENT

*From the Laboratory of the National Institute of Industrial
Psychology*

- I. *Constructional details of the voice key* (p. 117-119).
- II. *The relay and electric circuits* (p. 119-120).
- III. *Details of adjustment* (p. 120).

I. CONSTRUCTIONAL DETAILS OF THE VOICE KEY

THE object of this paper is to describe in detail a type of sensitive voice key that does not require a thermionic amplifier and is very cheap to make. The instrument described was built in the workshop of the National Institute of Industrial Psychology for use in research upon light-coloured 'blackboards'¹; a very similar instrument was constructed by the writer seven years ago and has been in use in the psychology laboratory of Reading University ever since.

This instrument does not differ in principle from the voice key of standard design but it differs very considerably in constructional details. The essentials of the design are shown in Figs. 1 and 2. A voice key constructed about double the dimensions indicated in Fig. 2 would represent a convenient compromise between bulk and sensitivity. The horn, sound-box and diaphragm are all soldered together into one piece. The horn is made from any sheet metal and may be as light as is compatible with rigidity. The soundbox requires to be fairly rigid and should preferably not be made of metal thinner than 24 gauge. The diaphragm must be made of very thin springy sheet metal: 'hard rolled' copper 2 mils (i.e. 0.002 in.) has been found to be very satisfactory and is readily obtainable. The construction of the jumper which is shown in greater detail in Fig. 2 is most important.

At the top is about an inch of clock spring. It is shown riveted to the brass supporting piece, but it may be attached in any way convenient

¹ Seymour, W. D. (1937). "An improved blackboard." *Brit. J. educ. Psychol.* vii, 259.

provided that the temper of the spring is not destroyed in the process. The hair spring below it is soldered on, and the brass contact piece at the bottom (about a quarter of an inch of 16 gauge brass wire) is also soldered.

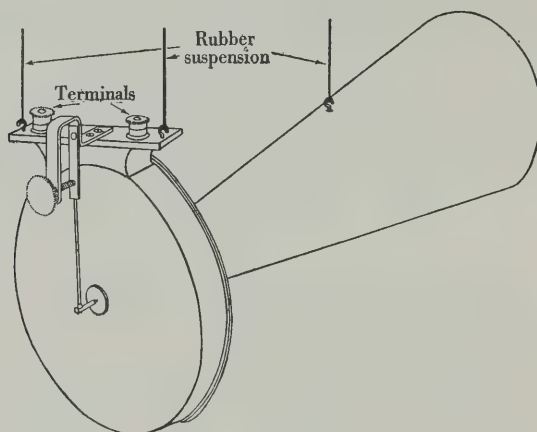


Fig. 1.

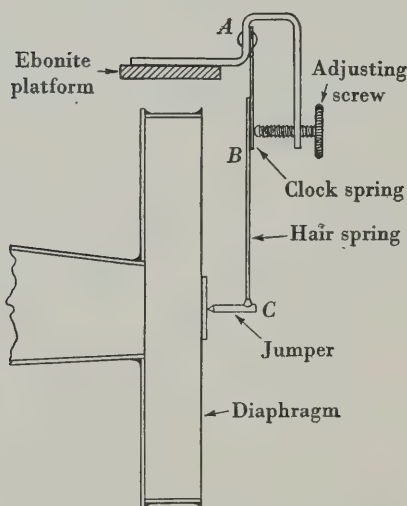


Fig. 2.

The nature of this spring is most important. Too heavy a gauge of spring will make the instrument insensitive, while a spring that is insufficiently resilient (such as a narrow strip of hard rolled copper or brass foil) will be unsatisfactory because it will continually need adjustment. A very

satisfactory form of spring can be made by taking a piece of 28 gauge steel wire (a single strand from a bowden cable) and hammering it out till it forms a ribbon about four times its original width. The contact piece bears on a disc of thin sheet brass soldered to the centre of the copper diaphragm. Platinum contacts would be better in theory but 'brass to brass' works very well in practice. The contact pieces may be cleaned by rubbing gently with a small strip of very fine emery cloth when necessary.

The suspension of the instrument is also important. Although a rubber suspension employing the small rubber rings sold by stationers has always been used, there is no doubt that the helical metal springs would be equally satisfactory. Whatever suspension is used, it must allow the instrument to oscillate up and down freely and not more rapidly than one excursion per second. (The side to side 'pendulum-wise' movement will be more rapid than this.) An alternative form of suspension that makes it very easy to adjust the instrument to any angle is shown in Fig. 3.

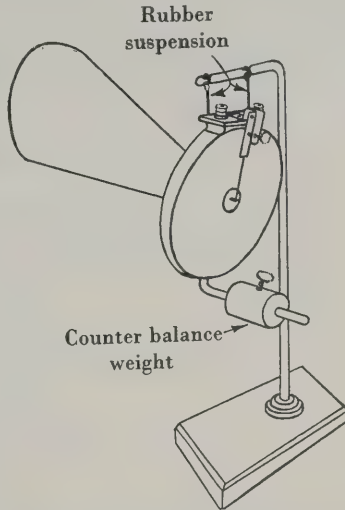


Fig. 3.

II. THE RELAY AND ELECTRIC CIRCUITS

A suitable relay and the electric circuit employed is shown in Fig. 4. No doubt there are many commercial designs of relay that could be employed satisfactorily. If a relay of this form is built it is an advantage to use silicon steel transformer stampings, such as stalloy, for the magnet core. The residual magnetization of a core of transformer stampings is negligible. This not only keeps down the time lag of the relay but reduces its variability. The resistance R_2 , which may be anything from 100 to 1000 ohms, is essential to prevent sparking at the contacts of the voice key. The rheostat R_1 is used to adjust the current to the smallest value at which the relay will operate.

The relay used in the research upon light-coloured 'blackboards' had a stalloy core half an inch by a quarter of an inch in section and each bobbin was wound with about three hundred turns of 28 s.w.g. copper wire. The current through this winding and the contacts of the voice key, when the latter was set for medium sensitivity, was about a tenth

of an ampère. The resistance R_2 effectively prevents all sparking at the contacts, so that the value of this current is unimportant. The magnet windings were chosen so that this part of the instrument could be wired up with the same 4 V. accumulator used with the chronograph. With a different setting of R_1 they would be quite suitable for use with a 2 V. accumulator. If it were desired to use a flash lamp battery for this circuit

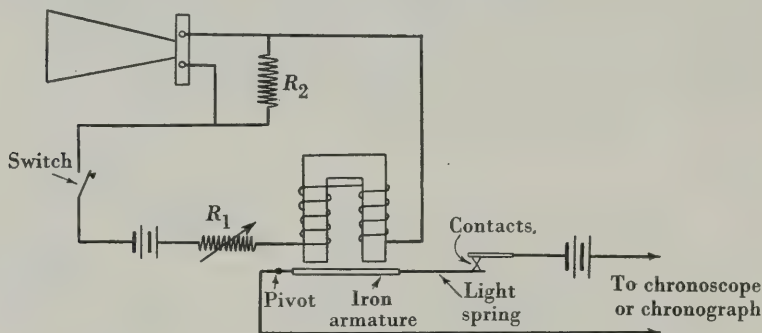


Fig. 4.

it would be better for reasons of economy to use a finer wire and more turns. About twice the number of turns of 32 s.w.g. would probably be satisfactory. The effect of sound waves upon this voice key is to produce a small fluctuation in a comparatively large steady current. The use of a commercial relay, which is operated by the cessation of a very small current, would necessitate a Wheatstone bridge type of circuit to balance out the steady current. It would still be essential to include the resistance R_2 .

III. DETAILS OF ADJUSTMENT

When the apparatus is set up for use the adjusting screw of the voice key is turned till the jumper just makes contact with the diaphragm; the rheostat R_1 is then adjusted so that it passes the smallest current that will hold up the armature. Next, the adjusting screw is rotated very slowly till the relay breaks. The adjusting screw is then turned back a very little way and the final adjustment to the right degree of sensitivity is found by trial and error. A voice key designed in this way can be so adjusted that it reacts to any sound made in a normal speaking voice, even to the sibilant consonants such as S and Z, but if it is as finely adjusted as this it may react to irrelevant sounds. It is a good plan to adjust it to fire at the vowel 'ee' or a word containing it. If 'ee' will make it fire, any other vowel will, and consequently any spoken word.

(*Manuscript received 28 May 1938*)

CHARACTERISTIC MOTIVATION IN THE ACTIVITIES OF SCHOOL-GIRLS

BY M. D. VERNON

From the Cambridge Psychological Laboratory

PART I

- I. *General description of methods of investigation* (pp. 121–124).
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I. GENERAL DESCRIPTION OF METHODS OF INVESTIGATION

(1) *Experimental method*

THE experiments here described were carried out in order to discover if it is possible to detect the existence, in girls of school age, of underlying drives or tendencies to action which determine the main lines of their behaviour, and may be expected to direct them in future towards certain occupations or ways of life. An experiment reported in a previous paper (*Brit. J. educ. Psychol.* (1937), VII, 302 and (1938), VIII, 1) indicated that it seemed possible to discover such drives or behaviour tendencies in University students. The more important of these drives were there described, and their manner of functioning illustrated in the remarks made by the students in answer to a series of questions about their interests, activities, etc. Clearly it is both interesting and important to discover if such drives are operating sufficiently strongly in younger girls to have a decisive effect on their school careers and on their selection of a future career or occupation.

The following groups of girls were selected for study:

Group (a): 29 girls, aged 13½–16 (average 14–9) from a provincial High School; these girls made up the greater part of two parallel forms working for the School Certificate examination, which they were to take in rather less than two years from the time of the experiment. Their education was in no way specialized.

Group (b): 28 girls, aged 12–14½ (average 13–6) from a rural Senior School; they were the oldest and most intelligent girls in the school, and were for the most part shortly due to leave. Their curriculum consisted partly of theoretical subjects (English, Arithmetic, etc.) and partly of practical ones (domestic science).

Group (c): 51 girls, aged 15½–19 (average 17–6) from a large boarding school in the south of England; these girls were all doing post-School Certificate work. The majority of them had passed the School Certificate, though some had failed in it or not taken it. Some of these girls were specializing, with a view to entering the Universities or taking up specialized careers. The remainder were doing a general educational course including theoretical and practical subjects (e.g. domestic science) until the end of the school year, when they would leave school.

Series of questions (one for each group) were drawn up, similar in type though different in detail from those used for the University students. That is to say, the questions were directed towards finding out interests and occupational wishes; but throughout less weight was assigned to the direct answers than to the indirect evidence provided by the reasons given for those interests, the manner in which they were described, etc. As additional information about the girls there were obtained: For Groups (*a*) and (*c*), short descriptive sketches from the headmistresses of the parentage and outstanding characteristics (intellectual, temperamental and behavioural) of each girl. For Group (*b*), brief characterizations and opinions about each girl were obtained from two of the women teachers in the school. For the evaluation of school performance, some assistance was obtained for Group (*a*) from class marks; for Group (*c*), from School Certificate results, when obtained; and for Group (*b*), from intelligence tests previously administered by Dr A. Crowther.

The general form of the questions was as follows:

(1) *Group (a)*

Can you tell me what you most enjoy doing at school...what lessons you like best? What part of (so-and-so) do you like best?

Do you play games? Which do you like best? Are you in any of the teams? A house representative?

Do you belong to the orchestra? Choir? Debating society? Do you enjoy these? Do you like speaking at the debating society?

What sort of things do you like doing out of school...in the holidays? Which do you like best, term or holidays? What is it about term (holidays) that makes you like it best?

Do you know a lot of girls at school? Have you any special friends? Do you do things with them out of school?

What are the mistresses like...are they nice? Any of them specially?

Have you thought at all about what you want to do when you leave school? What is it about (so-and-so) that makes you want to do it? Have you ever thought of anything else you would like to do? Are your parents quite glad for you to do (so-and-so)? Are you keen to have a career, or would you rather just stay at home?

(2) *Group (b)*

Can you tell me what you enjoy most doing at school...what lessons you like best? What part of (so-and-so) do you like best?

What sort of things do you do when you are out of school? In the week-ends? Do you ever do things with the other girls out of school?

Which do you like best, school or holidays? What is it about school (holidays) that makes you like it best?

Have you thought at all what you want to do when you leave school? What is it about (so-and-so) that makes you want to do it? Which would you like best, town or country? Are your parents pleased you should do (so-and-so)?

Shall you be glad or sorry to leave school? What is it that makes you glad (sorry)?

(3) *Group (c)*

Can you tell me what you most enjoy doing at school...first of all in school hours? What part of (so-and-so) is it that you like best?

Do you do much work alone, or mostly in class? Which do you prefer?

What do you like best doing out of school hours?

Do you play games? Which do you like best? Are you in any of the teams? Captain?

Do you go in for: music—singing and/or playing—; acting and/or elocution; arts and/or craft-work; debating—do you do much speaking? Do you belong to any of the clubs?

Are you a prefect? Do the duties take up much of your time? Do you enjoy them, or are they rather a bore?

Have you many friends at school? Some particular ones? Do you see anything of them in the holidays?

What sort of things do you like doing in the holidays? Do you like being in the town or the country best? Do you ever go away for holidays with your family? Which do you like best, term or holidays? What is it about term (holidays) that makes you like it best?

Have you thought at all about what you want to do when you leave school? What is it about (so-and-so) that makes you want to do it? Have you ever thought of any other jobs you would like to do? Are your parents glad for you to do that? Are you keen on having a career, or would you rather just stay at home? Shall you be sorry to leave school or quite glad?

(2) *Presentation of results*

It is difficult to choose the best method of presenting the experimental results. Although there seemed to be no doubt as to the existence of fundamental drives such as those described in the previous paper, yet it

did not seem desirable to study these drives or their manner of functioning in the abstract, apart from a general description of the individual who possessed them. It is possible to trace a general similarity in the nature and functioning of a given drive in a number of different individuals. But individual differences do exist; the drive is modified by other drives, and the behaviour in which it manifests itself by the particular personality and environment of the individual. Moreover, it is greatly preferable to study individual personality functioning as a whole and showing characteristic behaviour tendencies, rather than single and separate drives functioning in isolation. Consequently it seemed best to follow the procedure adopted in the previous paper and describe individual cases whose behaviour, wishes and interests manifested the operation of various drives. Space prohibits a description of every case in all three groups, but a number of typical cases are set forth in the ensuing section.

The former procedure was also followed in that an attempt was made to characterize individuals by selecting from their answers those statements which showed up their characteristic drives most clearly. This was less easy to do with school-girls than with University students who are not only more formed in character, but also more skilled in self-expression, though they are perhaps also more concerned to conceal any undesirable tendencies. But in the following descriptions the characterizations are where necessary filled out by (1) impressions of the girl's manner and behaviour gained during the interview, (2) in Groups (*a*) and (*b*), similar impressions gained by observation of the girls' behaviour in class, (3) statements about parentage and school behaviour made by the Staff (subjective judgements and evaluations by the Staff have, however, been excluded). The class marks, School Certificate results and test results mentioned above were also referred to in some cases. It is clear that this procedure is not consistent with an accurate checking and validation against each other of the impressions proceeding from different sources. But the general aim of the experiment was to obtain adequate character studies of the girls by the use of all available means.

II. THE FUNCTIONING OF THE DRIVES IN INDIVIDUAL CASES

In this section are described a certain number of individuals who showed most clearly in their answers how their wishes and interests were determined by one or more of the main drives or tendencies to action which appeared in the University students. These drives were towards: social conformity, humanitarianism, independence, security, activity, superiority, dominance, display and pleasure. In addition to the cases in

whom one or more of these drives functioned strongly and without much hindrance, are certain cases in whom there was a conflict of drives; or else the free functioning of the drive was inhibited by some natural or environmental disability to which the individual was subject. Such cases were also fairly frequent among the University students.

It will be observed that the number of individuals chosen from each of these groups to demonstrate any particular drive varies considerably. It was in fact the case that certain drives were manifested more frequently and more clearly in some groups than in others. This seems to have been due to three factors:

- (1) The variation in age, and hence in intellectual and emotional maturity, between the groups;
- (2) The favourable selection for intelligence and general culture in Group (c) and part of Group (a); and the unfavourable selection for these qualities in Group (b);
- (3) The differences in social environment.

For these reasons the drives themselves varied in strength and frequency in the three groups; and the wishes, interests and activities in which they manifested themselves varied even more. Consequently an attempt is made to describe the distribution of the drives according to groups in Part II, Section III of this paper; and to relate distribution and manifestation to the social background in Part II, Section IV.

Social conformity is demonstrated in extreme gregariousness, desire to be with people and work with them; and also in tendencies to imitate their behaviour, echo their opinions and act in such a manner as to win their approval. Generally the 'people' whose society is desired are the nearest congenial social group—with these girls, the group of school contemporaries. If for any reason the individual cannot make contact with this group, or prefers some other group, she may feel uneasy, anxious or maladjusted.

In general the typical social conformer in Group (c) was quite well adjusted:

C4 likes the discussions in the class on economics and philosophy,¹ but "doesn't care for any other school subjects" and doesn't like working alone; belongs to the history club and "likes listening to others" speak, but "doesn't like speaking"; is a sub-prefect and enjoys the duties; has a lot of friends. Prefers holidays to term—"sometimes misses all the girls", but is "sorry to come back—doesn't like leaving people and things at home", though "soon gets used to school routine".

S4 is specializing in languages, but "likes doing out-door things", and reading,

¹ This interest was somewhat of a social tradition in this group (see Part II).

knitting, listening to the wireless. Is a prefect—"a responsible position, but not much duties"—and likes it. Has a lot of friends—"used to have a 'crowd', but they have left now"; sees them in the holidays. Prefers holidays—"boarding school makes you appreciate home—clothes, shops, etc." Wants to go to the University and "hopes to get ideas (about jobs) from meeting people who have done interesting things". "Mother's keen (for her to have a career), but step-father wants her to stay at home and look after the house—would bore her."

B2 likes games, gym, country dancing, housewifery, acting, art—"makes papier maché animals" and has "designed an under-water scene for a bathroom". Is a prefect—"finds it interesting"—"you have more jobs and responsibility", but she "likes doing these". Has a lot of friends and meets them in holidays; prefers holidays to term—"likes being with family"; but "loves it here", will be "sorry to leave", it "makes a change having to do what you don't want". Is going to take up nursery school work—"loves children", "likes small boys best".

In Group (a) H3 also presented a case of the well-adjusted social conformer. Though inferior to many of her companions in culture, intelligence and social standing, she was cheerful, friendly and contented:

She likes "doing things with her fingers"—drawing—designs or decorative work—needlework and knitting; would "much rather listen to others in debates" than talk herself; has many friends in and out of school, rides with them and meets them at Guide meetings; is very keen on riding—"spends all her free time on it"—helps her father (a riding master) with his horses; would like to take up something to do with riding, but realizes "there is no opening in it—there are too many riding schools"; but thinks of being "a child nurse or a young children's teacher"—"has had a lot to do with little children, likes them".

In the Group (c) girls described above there were slight indications of conflict between the home and school groups and their respective loyalties. In some of the cases in Group (a) there was a stronger conflict between school and home; the atmosphere of the former was academic and highly cultured, and that of the latter simple, bourgeois and domestic. V1, for instance, found it hard to adopt school interests and activities, since her own bent was towards the practical and domestic:

She is "fond of domestic science"—"does quite a lot at home" and "would like to do more at school"; "likes doing things with her hands" and "would like to take up domestic science". "Wouldn't like it all holidays"—"doesn't always know what to do at home"; "lives in a village, not much to do there". Has several friends at school but they don't live near her; has some friends at home, "does things with them".

E1 found some difficulty in adopting the interests, etc., of her present school surroundings, and longed for the familiar atmosphere of the school she had just left:

She likes Guides—"it used to be fun in Scotland" but she's "new to it here"; knows some of the girls in her class and is friends with one who is also a Guide; hopes

to go to Scotland next summer and see her friends there; likes writing letters to them. Likes "playing with small children, but doesn't know any here". Has "thought of thousands of things she might do" as a career, but doesn't know which to choose; "would like to decide soon"; would "like to do something with horses, dogs or small children"; "someone suggested a hospital almoner—sounds interesting—would enjoy that".

E1 showed a tendency to avoid the difficulty in conforming to a social setting which was unfamiliar and possibly too intelligent and highly academic, by an escape into the society of children or animals. K1, also from Group (a), showed a still more marked example of the same tendency. She was very shy in manner, found the use of words difficult; she was out of touch with people, and the society of animals was highly congenial to her:

She is not friends with many girls, and hasn't any friends at home. Prefers holidays to term—"you can do what you like"; likes riding, "by herself or with a groom or farmer"; likes walking; keeps pets—"a cat and twelve bantams"—; likes working with animals and poultry and "would like to have a farm"; her "father has bought a farm and will keep it for her".

M5 in Group (c) presented rather a similar case. She was plain, awkward and unintelligent, and nervous and fidgety in manner. She seemed to be suffering from a strong feeling of inferiority which appeared both in her desire to escape into the society of animals, and in a compensatory eagerness to be 'presented' at Court:

She likes best playing the piano and organ, but prefers holidays to school—"likes home better". Likes riding best in the holidays. Is leaving at Easter and being 'presented' at Court—"is longing for it—has heard so much about it"—it is "an experience you never forget". Wants to do something when she leaves; there are "lots of things she'd like to do, but is not clever enough"; would like to do something with animals—"kennel or stable work"; "wanted to be a vet., but is not clever enough".

In Group (b) the majority of girls seemed to be strongly motivated by social conformity, and to experience little conflict or difficulty in achieving that conformity. It is not, unfortunately, very easy to illustrate this from their answers to questions, since inarticulateness and inability to express themselves, especially to strangers, formed part of their customary social behaviour. R1 affords as good an example as any of a large number of similar cases:

She likes physical training, music, needlework and domestic science, especially cooking and baking; out of school likes knitting and reading schoolgirl tales; at week-ends takes a baby out. Prefers school to holidays—"there is nothing to do in holidays"—"nowhere to go"—but "plenty to do at school". When she leaves she "wants to go in for a nursemaid's job" or a housemaid's; "Mother thinks a nursemaid is a better

job and she is fond of children". "Likes staying on at school but won't mind leaving"; "Mother says she might as well stay on".

Here the wishes of parents were in harmony with the wishes of the child and with the activities customary in this group. In the case of H1, however, the parents (her father was a policeman) wished the child to rise above the social level of the group and to enter an occupation of superior social status for which the child was not really fitted. She was very docile in nature, eager and anxious to conform both to her parents' wishes and to the usual activities of the group, but found it hard to do so:

She likes physical training, science, music and needlework; out of school she spends a lot of time "doing lessons for a scholarship"; "helps mother", "sometimes goes out in the car", but "doesn't do things with friends". Prefers school to holidays—"gets tired of holidays". Is going to the Technical School (if she gets a scholarship there, which is unlikely) and wants to be "either in an office or a secretary"; or do dressmaking—would prefer this, she "likes making things".

There were also cases in Groups (a) and (c) of girls who were being forced along by the tendency to conform to their parents' ambitious wishes, or were worried and anxious because they felt unable to do so. An example of the former type was A1 in Class (a). She had little natural ambition, but her father was eager for her to succeed in an academic career:

She likes maths. because it is "logical and sensible; likes facts, not imaginary things". Out of school likes reading—"chiefly adventure stories", but has "not much time out of school". "Father wants her to take up maths."; she "wants to go to the University"; "should like to do something with maths. but not teach it; everyone seems to think she ought to teach, but she doesn't fancy it"; "would dislike trying to make other people understand".

H5 in Group (c), a girl of some intelligence and independence of mind, was nevertheless oppressed by the difficulties of living up to the standard of attainment set by school and parents, and of conforming to the wishes of both these groups; and by the feeling of moral obligation to serve the community in general:

She likes history; loves reading; likes working alone—"you don't have to worry with other people's difficulties if working alone". Likes both school and holidays, but "doesn't like the change from one to the other", it's "such a complete change of people"; in the holidays likes "walking for miles and miles in the country among the trees and hills" and doesn't like the town—"you have to wear hats, etc., in the town". Is working for the University but "may not actually go there"—"it costs a lot and there are younger ones to be educated". Her "parents thought of making her do secretarial work", but she's "not thrilled by it"—"has never met anything yet which thrilled her, but feels there must be something round the corner"; "might possibly do social work, but this might be very depressing"; though "somebody's got to do that

kind of thing, people are always wanted for it". "Wants to make her mark at something"; it would be "quite amusing to stay at home, but she wouldn't really like to do nothing".

Most pathetic of all was F1 in Group (a), whose father was a domestic tyrant; he sent her to a secondary school, for which she was quite unfitted; and she was cheating in her school work in order to keep up to a standard which she could not reach. She wanted to take up child nursing, but he was forcing her to take a secretarial training:

She doesn't play games; but out of school "likes roaming round the country finding flowers"; likes gardening. Likes term better than holidays because she "meets more people"; likes "looking after children whenever she gets the chance"; wants to look after children when she leaves—"has always wanted to ever since she can remember"; her sister is matron in a Waifs and Strays Home and she would like to work there—"anywhere where she could help"; "nice there because the children are happy"; would be hard work, but "there is hard work in everything"; mother approves of this, but "father wants her to do shorthand and typing"; is leaving at Christmas, and will do shorthand and typing for a bit.

Humanitarianism. This term covers what was in fact a complex of tendencies towards the furthering of interest in, or concern for, people as such—as human beings living and functioning in their own right—not regarded simply as a more or less pleasurable part of the social environment. Sometimes, but not always, it included tendencies towards sympathy, service, help and protection. It was to be distinguished from the social conformity drive which included (1) a tendency towards being with people, obtaining social contacts, working with people; and also in some cases (2) a moral obligation towards social service of some kind, dictated by the desire to win social approval for activities which are regarded as highly admirable in women. Thus we saw that quite a number of the girls among the social conformers (notably H3 (see p. 126)) wished to take up work involving social service or the care and protection of young children. But it was not possible to say definitely if they were motivated by a genuine and inherent humanitarian drive, or by the wish to undertake a socially approved and admired occupation.

It was, indeed, a matter of some difficulty to select cases of genuine humanitarianism. B3 in Group (c) appeared to be such a case. She was American and had come to the school as an 'exchange' from an American school; and it is possible that even she was to some extent conforming to the kindly and friendly customs and traditions of that social background:

She is interested in English literature and history—not modern post-war history, but "something you can really see, which you can't with your own period"; in music, art. "Doesn't like sports, except individual ones"; "doesn't enjoy the game for itself,

but likes being with the people she likes". Likes working alone or with three or four friends, but also "likes discussing things" in class; had many special friends in her other, American, school, but English girls "are hard to make friends with at first". In holidays stays with an English family, and "likes doing things with the family"; also "likes meeting people". Her school in America was a long way from home, it was "more interesting to be with different people in a different part of the country". When she has finished at the University, will do "anything that seems interesting", possibly teaching; is "very fond of children". "Would marry if she fell in love—has no anxiety for a career as such, but would like to do things she's interested in; also one ought to work for a bit after leaving the University, before getting married."

G2, a girl of very high intelligence, seemed to be a case of genuine humanitarianism, functioning as a desire to do social service, which conflicted with her ambition to do well in academic pursuits. But her humanitarianism may have been reinforced by the influence of her father, whose feeling of social obligation and responsibility was very strong:

She is most interested in modern languages, but also likes writing, acting, art. Wants to go to the University; "if she could get a good post in University work, would like one, in modern languages or literature"; if not, would like "social service of some kind as a career to fall back on—would like to do probation work"; "would like to do something useful"; academic life is "nice as a background, but unless a very exciting job offered, would prefer a more material (? practical) type of job".

C3 was interested in people in general and in their activities, and also had a considerable leaning towards social service, with possibly a somewhat uneasy feeling of social obligation:

She likes art best, and intends to take up architecture, because she "wanted to do something in business and in art"; intends to go to a school of architecture and train, then "start in an office"; "would like to do town planning and re-conditioning". But she dislikes the physics she has to learn in connexion with architecture—it is "inhuman". Likes history—"is interested in the past", especially the Italian Renaissance—they were "more civilized than the English". Likes playing netball, but is "not a sportswoman"; "hates the seriousness of it all"; prefers "reading history and historical novels" to most games. Is a sub-prefect, but hasn't many duties—it is "chiefly being good" which "isn't too much of a strain"; "very much enjoys school—thinks of 'life' more at school than in the holidays"; will be sorry to leave school—"there's a certain stability about it—going out into the wide world is rather frightening" though she will be "happy once she's made the break". If she fails in her architectural work, "might go into politics, but doesn't want to frightfully"; "might like a parliamentary career, but mightn't be convincing as a speaker"; but "would like to be a J.P. in a children's court".

In D2 the interest in people was more detached, with less feeling of sympathy, and no sense of obligation:

She is specializing in languages; likes all kinds of literature but "is also interested in people and in foreign civilizations". "Enjoys being a prefect"—"is interested in

people—likes watching them and seeing how they develop”; was going to try Froebel work, but someone suggested she might go to the University, so she thought she would try it; had “thought of journalism after the University—something with travelling” because she is “interested in international relations”; also “had thought of teaching”—would like “studying the people she taught, watching their reactions, but would get bored with teaching the same thing over and over again”.

In T2 there probably were genuine humanitarian tendencies. But they were distorted and overlaid by loyalties and obligations arising from conformity to the wishes and ideas of parents, school staff, school companions, etc. In consequence she was confused, anxious and undecided:

She likes work best of school activities; is specializing in modern languages and likes the literature, but is “also interested in the countries themselves”; likes economics and “is interested in international politics”; “is trying to learn to speak” in political debates—“does quite a lot, though she doesn’t like it much”; also “finds expressing herself in writing difficult”. Is a prefect and the second head of her house; finds the duties very interesting—“the responsibility in choosing other prefects”; “enjoys routine work, remembering things, also keeping discipline—though not ticking people off”. Also likes seeing a lot of the housemistresses—the young ones “understand your point of view better than the older ones and are easier to talk to”; there is “a crowd of varied people on the staff, such interesting people to talk to, with outside interests”. Had meant to go to College, but “doesn’t much want to go now”; would like “to be a travelling secretary to some one who goes abroad”; “got so interested in countries from travelling, but doesn’t know how to link up her ideas about them”; would also like to do some social work, at least “as an aside”, for one or two evenings a week; “lives in an atmosphere of social work at home”—her father is a mayor—and also “is interested in people as such”. Has a “very happy home”—“has an absolutely free choice” as to what she will do.

In some cases there was a conflict between independence on the one hand (with possibly some superiority) and humanitarianism on the other. This appeared in F2, a German Jewish girl who had been sent to school in England to escape conditions in Germany:

She likes best music, English literature and history—particularly Renaissance history; likes speaking in political debates—“likes to find out what different people think even if it is against her”; is a sub-prefect—one “comes more into contact with the other girls” than the prefects do; “doesn’t like it when someone is too bossy”—“otherwise is a good system”. Has got to know a lot of people in the school although they “seem to keep in sets rather”; will be sorry to leave—“you meet so many different people” at school; but “will be glad of a change too, and of a free-er atmosphere”—“everything goes to bells here”. Doesn’t know how to decide what to do when she leaves—might do some work in languages, might teach English but “wouldn’t like it much—you just stay a teacher”, and “hasn’t enough patience”; is also “interested in nursing” but there are “many things against it”.

L1 in Group (a) was an example of rather a similar conflict. But she

felt the impossibility of taking up the career she desired as a threat to her independence, which was thus suffering from a rather painful inhibition:

She likes doing practical science, "seeing the actual thing and doing it for yourself"; but also likes history, especially modern history "because it's about people" and geography "because it's about where people live and how the environment affects them and their trade". Gets "worried with school work, so much of it seems so futile", "so many petty things to be done at school"; "school life is tiresome", the girls in her form are much younger than she is and are therefore "hard to make friends with". Wanted to be a doctor, and as she has been "thwarted" in that (her health was not good enough), is not very keen on a regular job; but might take up singing and concert work—wouldn't like to teach music, "hasn't enough patience".

W2, also in Group (a), was two years younger than F2 and L1; and probably for that reason the humanitarian tendencies were less clearly visible. But her occupational wishes suggested an underlying humanitarianism; her reason for not wanting to be a nurse or a doctor showed a rather exaggerated feeling of social obligation, as well as a drive towards independence:

She likes reading history and English literature and writing essays, doing craft-work and drawing—likes painting "big things, in poster paints, not designs so much as pictures—has been doing illustrations for 'Job'"; likes singing, playing in the orchestra; likes going on the river and "exploring how far she can get", but regrets that so few of her friends "are allowed to go out alone" on the river. Has thought of being a missionary, a policewoman, a teacher—teaching younger children, not older ones because she "wouldn't know what they think about"; but not a secretary, because she "hates sitting tied up indoors all day long"; or a nurse or a doctor, because she would "hate to think people's lives depended on her".

Independence. The above three cases all gave some idea of the functioning of the independence drive in directing the individual towards independent activity, original interests, occupations requiring initiative and the ability to stand alone. Perhaps the clearest case of this drive was that of M1, a girl in Group (c) of very high intelligence and maturity of outlook, who had travelled a good deal and lived abroad. She also showed some tendency towards superiority, but this was tempered by a half-humorous acceptance of other people and their peculiarities:

She is most interested in modern languages—"does them chiefly for their literature"; but also likes being on the Continent—"likes the people, likes speaking French". Used to act, but has not time now—"enjoys watching others more"; likes tennis—is not particularly good at it but "gets fun from it"; doesn't belong to any of the school clubs—one "can get as much out of reading for oneself as from going to the clubs". Is a sub-prefect; it is a "terrible bore—no one likes it, but they all hope to be a prefect and get a study". Prefers holidays to school—"likes the rest from school routine; gets very boring seeing the same people day by day and also knowing what's going to

happen each moment". Wants to go to the University; and "would like to get a well-paid job, with liberty to do and think what she likes, and some leisure—something not completely unsympathetic"; possibly the Civil Service, or "free-lance journalism"; "has thought of secretarial work—interesting if one got someone interesting to work for". Doesn't want to do teaching—"hasn't got the patience".

Another example in Group (c) was that of K1, who was, however, much less intelligent in her outlook:

She is most interested in history, especially political history, and likes the Tudor and Stuart periods best; runs the political debates, "speaks a lot and organizes too". Is "quite glad not to be a prefect, the duties are rather a bore"; prefers holidays to term—"you can do what you like" (in holidays); "gets rather sick of school". Is going to the University, but "can't think what she'll do afterwards"; "would like something in the history line"; "has no patience with children, to teach them"; her mother is "keen on secretarial work", but she thinks it would be "rather dull", but might "take it up if she can find an interesting opening". Might go in for army nursing, though "perhaps she is not suited for it"; but it would give an opportunity to go abroad—"would like to go abroad".

In the case of H2 in Group (a) we observe what occurs when natural independence is thwarted, in this case by the somewhat brusque and autocratic treatment meted out by her father. She was very offhand in manner and aggressive in her attitude towards authority:

She prefers holidays to school because they give her more freedom; is very fond of drawing—likes drawing "anything out of her head", but mostly does it out of school—does a lot when she has time; also likes reading, chiefly travel books. When she leaves school would like to do something but "doesn't want to do a regular piece of work"; knows "lots of things she wouldn't like to do"—being a nurse or a school-mistress; it would be "awful to stand up and talk to people who are not interested"—"awful to be treated as the girls at her school treat some of the mistresses".

Security. The drive towards security was perhaps antithetical to the drive towards independence, since it directed the individual towards a safe, familiar, reliable occupation with little risk attached, and generally little individual initiative required. It was infrequent among the Group (c) girls, who were usually fairly well assured of financial and social security. But one or two cases occurred in girls whose parents were in rather a precarious financial position:

Thus M2 wants to write, but "writing is not paying enough to start on—wants something definite and solid"; "will have to get a job of some sort"; may "probably teach first" but won't like it much.

H1 "would like to travel about for a firm and interview people in business"—but it is "difficult to get a job". "May do the Civil Service (Executive)—her father wants her to, thinks it a safer job, you are sure of it once you get in." She "has always really

wanted to go on the stage, but is afraid she has not got the talent"; "may get a year at the R.A.D.A."; it is "rather precarious—she wants something to fall back on if she can't get on on the stage".

W6 "had thought of the Civil Service—thinks she might like it—steady income, safe job, but difficult to get into".

One might suppose that economic insecurity would press much more hardly on the girls in Groups (a) and (b), since almost all of them were far less well-to-do. Yet curiously enough there was no reference in Group (b) to getting "a safe job". One or two girls in Group (a) alluded to it, though actually these did not come from the poorest homes; and it seemed that what they really desired was to obtain a recognized position in society such as the wage-earner may hope for:

H1 "keeps changing her mind about jobs"; "first thought of teaching"—but it would be "a long while to wait before earning anything", "doesn't want to wait till she's over twenty" before she begins to earn anything; would like the Civil Service or "some sort of secretarial job—an office, not a private secretary".

H4 "used to want to be a school-mistress—would hate it now—so difficult, would never know what to say or how to answer questions"; it would be "rather nice to do something settled—wouldn't mind it being hard work if she liked it".

It seems probable that for some of the girls in Groups (a) and (b) security consisted in the care and support of their parents. The naturally timid child was more aware of the fear of separation from parents than of the fear of poverty or unemployment. Particularly was this the case with certain girls who were retarded in their emotional development. This was found among some of the girls in Group (b) who seemed to be very childish for their ages. B1 in particular was very shy, nervous and fidgety, easily distracted by interruptions, and finding it very hard to answer questions:

She prefers holidays to school, because "she can have Mother then". Wants to go into service "in the country, near home"; "sometimes wishes she could always be at school", though she "wants to work".

B1 in Group (a) desired both economic and parental security. Her desire to cling to her parents resulted from the strong and sentimental influence exerted by her mother. B1's 'phantasy' interests showed a possible unconscious desire to escape:

These 'phantasy' interests include reading, especially sea and adventure stories, going to the theatre, listening to the wireless, watching the ships at sea; also she "would love to travel". "Wants to do something when she leaves school, but doesn't yet know what"—"won't be a nurse—hates it—has always disliked it"; has thought of being a librarian or a school secretary, or being in the Civil Service, or in a bank—

"bank is a good job"; "would rather have a job where she could stay at home—would hate going away from home—has only once been away from both parents".

There was a similar case in Group (c) of P1, a girl of nineteen, who had lived at home until she was seventeen and had then been sent to a boarding school. Her one desire was to be at home again:

She has only been at this school a year and has "not made many friends". Prefers holidays to term—"hates being away from home"; "hated leaving" her day school and coming here; in holidays "chiefly goes out with parents"; "hates being in a town". Has decided to "live at home" when she leaves and "go into her father's factory and learn to do shoe designing"; has "got to do something, and doesn't want to go away from home to do it"; "Mother wants her to stay at home too".

Activity. There was a considerable number of individuals who seemed to be so overflowing with energy that they never ceased in the pursuit of some interest or the carrying out of some occupation. This overflow of energy we have attributed to the functioning of the activity drive. It appeared to actuate a large number of interests and occupations of very varying character, and was not usually confined to one particular form of interest or activity. The individuals in whom the drive functioned strongly were not those of the purely superficial type who readily becomes bored and flutters restlessly from one amusement to another. At the same time, it is doubtful if they ever engaged in one activity for long enough to master it thoroughly or attain first class skill in it. This drive was characteristic of many of the girls in Group (c), three of whom are described below. First, W3 possessed much vitality and social charm, but not much originality or independence of thought:

She "enjoys doing everything"; loves acting, dancing, games, listening to music, making pottery; likes zoology and botany, philosophy and economics, and politics especially; is head of the school and "loves the work"; is captain of the second lacrosse team—selects and coaches the team. In the holidays likes riding, yachting, walking; enjoys both term and holidays, and is "never sure which kind of holiday she likes best". Is going as an 'exchange' to an American school for a year. Would "like to get into Parliament" eventually—her "father is very keen on it"; she might go to the London School of Economics, and "do practical social work as well as theoretical"; "doesn't know if she prefers intellectual work (to practical)—is terribly interested in what goes on in the world"; or might "go to a dramatic school".

W1 has less social charm, but more stability and perseverance:

She likes games and dancing best, and in the holidays prefers exercise, even walking, to cinemas, etc. Had intended to take up physical training, but was not tall enough to get into a Physical Training College. She is now specializing in science—likes "human anatomy" and dissection—"likes doing things with her hands"; also

likes drawing, modelling and domestic science; is going to take up massage and electro-therapy; will do a two-year course at the Swedish Institute, and after that do a course at a hospital or go abroad to get extra training in electro-therapy.

In M4 the activity drive was reinforced by social conformity, and the conviction that she would obtain much social approval and admiration for her intellectual and cultural abilities, her moral excellence and her social sympathies:

She is specializing in English literature, likes poetry particularly; also likes writing; hopes to read English at the University. Is very fond of music, sings, plays the piano, organ and violin, and composes songs, but doesn't want to specialize in music and do it at the University, "would rather keep it as a recreation"; "musicians seem to get into such a rut, get absorbed in it and don't see anything else". Plays a prominent part in political debates, and helps organize them; went to a summer school in Geneva last year, is going again this year; "enjoyed the lectures, enjoyed it all greatly". Is very keen on games and is lacrosse captain. Is head of her house and does a lot of organizing which she enjoys; is also "responsible for the atmosphere of the house" and "has to keep discipline". Loves "being among the people at school"; really prefers term to holidays because "there's more going on"; "it's more fun to have plenty to do". Wants to teach English because "one meets interesting people doing the same thing" and she "will like it as an experience". "Ultimately would like to do Borstal work"; has heard lectures about it and is "interested in that kind of work—likes studying different kinds of people".

In C1 in Group (a) a strong drive towards activity was also allied with strong social conformity which in her case took the form of gregariousness—the desire to be in a group of people and work with them, and not be left alone:

She likes games and drill best—"looks forward to drill, it cheers up the morning". Also likes science, physics especially—likes learning it practically though her "experiments never come out right"; likes maths., especially doing problems; likes history, especially economic history, because it has "hard and fast rules", "reasons and results". Doesn't want a monotonous job, "must have an interesting one"; thought of being a gym. mistress, "it seemed so easy"; but might not like teaching, "it might be awful"—she "would get so cross if they were all bored"; thought of being a masseuse, might like that, but it would be "rather grim having to be nice to people at nine in the morning"; but "likes a job with a lot of people"—would hate to be a secretary because it would be too lonely.

It was difficult to pick out good examples of the activity drive in Group (b), since their interests were so much less varied and widespread than those of the other groups. At the same time, we mentioned that R1 preferred school to holidays because "there is nothing to do in holidays" but "plenty to do at school". A number of other girls echoed this

opinion: "school occupies your mind"; "there's always something to do"; one "knows what to do all day"; whereas "there's not enough to do out of school", "you get tired of holidays unless you go away". Thus where the activity drive is strong, and intelligence and independence somewhat lacking there is liable to be some discontent and boredom.

Superiority. We have already described one or two cases (G2, F2 and M1 in Group (c)) who showed a certain amount of superiority allied with independence. The superiority drive directed individuals to attempt the achievement of superior intellectual or social status, or to excel others in whatever activity or occupation they engaged. It was frequent in Group (c), the girls in which were accustomed to possess superior culture and material possessions, and had rarely if ever experienced inferiority in social status or attainments; thus they were often inclined to regard the maintenance of their superiority as a natural right.

D1 is going to be a chartered accountant; "wanted to have some aim, not to do nothing"; "Mother wanted her to stay at home and do half-time work, but she wanted to do something more ambitious"; "wanted to take up music, but was afraid it would spoil it to work too hard at it, instead of using it as a pastime".

B4 "has always wanted to go to College since she was small"; "would like to get a research job afterwards"; "once thought of acting, doesn't think she's good enough".

S2 was doing modern languages but "thought they would only lead to teaching" so changed to geography—but hasn't yet found that geography "leads to any definite job". "Used to dislike school intensely, hated being disciplined—has got used to suffering it." Should "hate to stay on after the summer term and be the oldest in the house".

S1 took up science because she was "better at it and more interested in it than anything else". "Doesn't want to practice (medicine) but more jobs are open to a woman with a medical degree; would prefer a research job." "Will be glad to leave, would have liked to leave earlier."

R1 likes reading a lot, and seeing plays and films "if they are serious ones". Parents didn't want her to go to an English University, so she is going to an American one. "Doesn't have to work (for her living), but wants to do something—would like writing"; "has tried writing all sorts of things", but is "not satisfied with any of them". "Wanted to act but doesn't think she would be good enough."

B1 is very keen on elocution and acting, particularly the former, because she "has more faith in herself" when doing it and "gets rather nervous when acting"; there is "nothing else she likes at all as much", though she quite likes English, especially poetry, and dancing. Will be "content to leave school—will have got all she could out of it and given it all she could". Hopes to go to a dramatic college; "they develop you in every way and you can decide which line you prefer"; "once thought of taking up defective speech training", but "wouldn't like to teach in a school"—it is a "very narrow world"—"schoolmistresses become very narrow indeed and hardly ever get married". Would like the stage, but rather fears it because she mightn't be good enough—it is "rather shattering to the nerves to start with".

These answers showed up a frequent characteristic of those who were very eager to assert or maintain superiority, namely that they often desired to take up occupations such as writing, music, acting, in which individual and personal superiority can readily appear; but they were so afraid of being unable to excel sufficiently to satisfy their desire for superiority as to reject the occupation or their own efforts in it.

In Group (a) B3 showed an example of superiority allied with strong activity and a fair amount of independence:

She "has an idea for three weeks" what job she would like to do; then "it passes off and she has no idea". "Ages ago wanted to be a Member of Parliament because it would be rather grand." "Would like something in which she used her brain"; might enjoy reading classics at the University, but "might get tired of it". Wouldn't "care to be a secretary—that would be dull". Doesn't want to be a doctor or a dentist—one "would be sympathizing with people all the time".

B2 in Group (a) was in some ways similar to R1 in Group (c), but showed also signs of wishing to assert her superiority through domination of others:

She "enjoys all the school lessons"; likes reading, drawing "all sorts of things"; likes acting, though there isn't much opportunity for it in school—but she and a friend "got up a play" in the holidays; likes music, but not playing the piano—she "doesn't have proper lessons, just does it at home, and it is rather difficult to learn things properly"; "feels a strain at school"—she "spends so much energy at school, she doesn't feel like doing anything at home". Is "always changing her mind" about what she wants to be; once "wanted to be an artist, but it has worn off, she isn't good enough"; would "like to write", but when she starts to do it she "soon gets fed up with it, it gets so dull"; might like secretarial work—she is secretary to the Debating club and enjoys it—"likes arranging things in order, keeping them neat".

It is interesting to note B2's "feeling of strain" in keeping up to her own standard of achievement. T2 reported a similar feeling; but here the standard of achievement was based upon her father's abilities—he was a University lecturer in English. G1 in Group (c) presented a similar case; her father was a distinguished classicist. Both these girls were almost painfully shy and awkward in manner, as if they were afraid lest they should not appear as superior as they wished. Hence there were constant hesitations and withdrawals, as if they were defending themselves against possible disparagement or criticism:

B2 (Group (a)) is glad by the end of term that it's holidays, because she "feels she would like a rest"—hasn't much time for doing things out of school, in term time; but is also glad when term begins, because she "wants more work"—she likes doing the work at school. She wants to go to the University. Thinks it would be nice to teach

classics, though doesn't know if she would teach them well; would enjoy "finding out how people make their mistakes, trying to make them interested".

G1 (Group (b)) is especially interested in classics and also "likes reading English literature, especially poetry"; there are "no other things she specially likes at school"; though she belongs to the League of Nations club she "doesn't like speaking in it". Likes "working by herself on the whole"; only knows a few people at school really well. Prefers holidays to term—one has "more time to oneself". Wants to go to the University but "isn't sure if she will be able to"; has thought of the Civil Service, but "doesn't know what posts there are"; has "not thought of anything else—it seems a long way ahead".

H5 in Group (a) possessed a superiority drive of a more aggressive type. She was herself deficient in natural abilities, and resented her inferiority to her two abler sisters, one older and one younger than herself. She reacted to this painful situation by an attempt to 'go out of the field', in Lewin's terminology (*A Dynamic Theory of Personality*); firstly by going abroad, secondly by earning her own living:

She "doesn't enjoy anything at school" except perhaps drawing and playing games; but "would like to be able to speak languages"—would like to be able to speak French and German very well; "hates school, hates it all, gets tired and fed up with it—would like to leave and go abroad to school"; "doesn't like anything much out of school" except "going about and seeing places". "Mummy wants her to do domestic science and then live at home, not get a job, but would get tired of that, would get fed up with home"—there's "nothing to do"; would "like to earn some money of her own"; would like to train with a friend for child nursing—would "like to be with children and teach them languages".

Cases of superiority were few among the Group (b) girls; most of them were quite contented to stay as they were. But since the general level of achievement was low, a girl of moderate intelligence and somewhat superior social status such as B3 (her father was a police sergeant) had little difficulty in surpassing it; and was thus more contented and self-assured than many of the girls hitherto described in this category:

She likes maths. best—"any sort of maths."; is not fond of cooking. Prefers school to holidays—"gives one something to do"—there's "not enough to do in holidays except when you go away"; "last summer they went to Folkestone and Gorleston—she likes the sea". Wants to go to the Technical School; thinks she "will have no difficulty in this—was in top class at the Elementary School when she was only twelve"; wants to do shorthand and typing but "doesn't want a job in an office—would like a more varied job"—like the school secretary in her present school.

F1 was also of fairly good intelligence, but her father was a farm labourer, and thus she probably received less encouragement in her

ambitions—possibly even some opposition. She was aggressive and sulky in manner:

She also likes arithmetic and English—reading “adventures” particularly; prefers school to holidays—“there is never anything to do at home” (she seemed to be almost the only girl in this group who didn’t help with the housework); is taking the Technical School exam., which is “not hard to get through”, and “wants to work in an office”.

It is interesting to note the attitude of these two girls to ‘cooking’, the favourite activity of so many of the girls in Group (b).

Dominance. Related in some cases to the superiority drive was the drive towards dominance, manifested in the directing, organizing and manipulating of other people. Such was B2 in Group (a) (p. 138), who was secretary to the debating club and enjoyed it—“likes arranging things in order and keeping them neat”. The supposition is that it was not only things but also other people whom she liked to arrange. B4 in Group (c) (p. 137) was secretary to the history club, ran the League of Nations club and was captain of the netball team; and in her manner and way of speaking showed distinctly domineering tendencies. Again M4’s superabundant energy showed more than a little tendency to be employed in the manipulation and organization of others, though this was usually moralized as social service. Note for instance that she ‘is head of her house and does a lot of organizing which she enjoys; is also “responsible for the atmosphere of the house” and has to “keep discipline”’ (p. 136). Another rather similar case was that of A2, in whom the desire to excel and to dominate was strong, but who moralized it into an exaggerated sense of duty and of the gratitude she owed to the school and to her parents:

She likes acting and reciting best—“prefers women’s parts to men’s, though is often given men’s ones”; is specializing in modern languages—“took them because she was best at them, but really likes English best”. Runs the political debating society; is a house prefect, and “sometimes has the duties of the head of the house”; finds it “easy to keep other people in order, but not easy to keep herself in order”. Has a lot of casual acquaintances and one great friend, but “prefers being alone to being with a lot of people”. Will be very sorry to leave school—“has got into a rut and hates to leave ruts”. Wants to go to the University and get into the Civil Service; “is not keen on the work for itself, only chose it because it is a good job—good prospects, steady job, good pay—and one ought to get one after a good education”; “otherwise would have acted or been a doctor”; “if she fails will be the inevitable secretary”.

A clear case of both superiority and dominance drives was that of T1 in Group (a); she was physically deformed, and compensated for this by

an unusual degree of self-assurance, which might tend towards aggressiveness:

She likes any school subject "when she can do it, but not when she can't"; likes biology and chemistry—"wants to get on to dissecting—it would be lovely"; also likes history—"likes to hear what people have done". Is quite keen on getting a job if it is interesting—"something she really liked—not too monotonous"; wouldn't like to teach, she "would get so impatient she would throw things at them", but wouldn't mind "being a head mistress and running a school—would like organizing"; secretarial work might be "too routine—but nice to be a secretary to someone very interesting".

Display. The drive towards display, accompanied by the desire for social admiration, was not infrequently coupled with the superiority drive in individuals who not only wished to feel superior to others, but also wished to be looked up to and admired for it. Examples of this were B4 and B1 in Group (c) (p. 137) and B3 in Group (b) (p. 138). But there were also girls who cared little about excelling in itself so long as they could receive some recognition and applause from their contemporaries; in fact they were examples of vanity rather than of pride! Such cases were H4 in Group (c) and R1 in Group (a); they speak for themselves:

H4 likes dancing and gym. best, and had intended to take up ballet dancing professionally, had she been strong enough—"was entered for a ballet" and "used to do four hours (practising) a day". Is going to take up professional skating; "might try for a teaching job" or "exhibition skating"; "would rather do it casually, not as a permanent job"—"wouldn't like it so much if she had to do it". "Parents would like her to stay at home." At one time "thought of beauty culture—her father was quite willing to buy her a shop if she wanted one"; but "everyone seems to be doing it"—there are "too many shops"; she "sets people's hair at school—has the knack of it—it's great fun"; "would like doing the chemical side too, making beauty preparations, but it needs too much chemistry".

R1 likes debating—"likes arguing about something she knows about"; enjoys acting—did a lot at home before she came here to school—and dancing, especially tap-dancing—"but doesn't do it now"; likes playing games, but "hates netball—is not tall enough to catch the ball—gets knocked about—it's so senseless"; is captain of middle school tennis and hockey—was form representative last year—"had to tell the house captain how people play and arrange the team"—enjoyed it, but it was "awkward having to tell people they weren't to play". When she leaves would "like to dance for fun"—is "not good enough for a professional", which is "very hard work" too.

A rather similar case in Group (b) was that of L1, who desired admiration for her artistic skill and manual dexterity:

She likes needlework, especially embroidering "tea trays and table cloths". Wants either to take up hairdressing and be apprenticed to a shop in the town; or "would like to work in a florist's shop—likes arranging flowers".

Pleasure and variety. There was sometimes a close relationship between the drive towards display and the drive towards pleasure and variety. That is to say, the pleasure-seeker achieved the maximum of self-gratification with the minimum of effort in the society of congenial companions who approved and admired her behaviour and gratified her wishes. R1 in Group (a) and H4 in Group (c) were good examples of this link between pleasure seeking and display:

Thus R1 also likes biology—"it's much the nicest lesson because it's a new subject, not stale", they have only started on it this term. Her mother has suggested her taking up domestic science but she doesn't want to do this—"hates physics and chemistry"; hasn't thought much about jobs, and "gets bored because Mother is always talking about it"; would like to be a secretary if she could live in the country—but "also likes to be within reach of amusements".

H4 also thinks that "term is so monotonous—is rather fed up with it here—will be glad to leave". Prefers town to country in the holidays—"has two brothers and goes out with them a lot."

A rather similar case was that of M1 in Group (a):

She likes history and drawing, but "doesn't like any other lessons"; likes playing games and dancing, going to theatres and cinemas; prefers holidays to term because "there is not so much work to do"; is "rather keen on taking up dancing"—ball-room dancing, not stage dancing; would "like to go abroad, when she leaves, before starting a job"; parents want her to do domestic science—"would much prefer dancing"; would hate teaching domestic science.

In some other cases the pleasure drive appeared mainly as the anti-thesis of the activity drive. Thus the individual who was motivated by the former and not the latter was characterized less by a sustained effort to obtain pleasure and amusement than by a sort of restlessness and an inability to persevere in any activity which demanded thought, energy or concentration:

Thus in Group (c) W2 likes games and dancing best, but "likes everything except maths. and science"—"hasn't got a mind that way"; is specializing in domestic science—likes cooking and dressmaking best—"housewifery is harder work". Is a sub-prefect and "has to try to keep the others in order"—"keeping one's own friends in order is difficult". Prefers holidays to term—"gets fed up towards the end of term—it goes on too long"; likes outdoor life in the holidays "but not being too hearty"; it is dull being at the seaside in the spring "because no one else is there" and she's "not terribly good at golf". Will be "sorry in a way to leave"—it will be an "awfully strange feeling"; but will be "glad to get away from the routine"—"likes variety". Had thought of taking up physical training when she leaves; "might have done it if she'd had to do something", but it would be a "nuisance to go to a Physical Training College for two years" and she would "hate to teach it"—it would be "awful to be a school teacher". Is going to do a course of training in domestic science; "has thought

of a career but there seems to be nothing for her to do but domestic science", though she "may possibly get bored at home doing nothing"; her "parents want her to stay at home"—"Mother wants her to take over the housekeeping", but she doesn't want to do this.

A1 (Group (c)) likes tennis and dressmaking; likes French and history—especially "learning new things". Is a sub-prefect—finds the duties "rather a nuisance—boring—doesn't like bossing others about". Prefers holidays to term—likes to "get away from the routine—hates coming back to school", it is a "grind after the holidays"; will be "sorry to leave in some ways" but "glad to get away from the discipline". "People at school want her" to go to College, but she doesn't want to; "would like to have something to do, not sit at home all day"; "might go in for dressmaking"; "would really like to live at home and work at it at her leisure—a job ties you rather".

S1 in Group (b) was almost completely sluggish in her inactivity; it was this that accounted for her wish to stop at home, not timidity, in which she was completely lacking:

She likes needlework—"making frocks for herself"—and cooking; out of school she likes reading novels; would rather be at home than at school—"gets tired of school"; when she leaves will "stop at home for a bit with mother"; may go out to work later, but will "wait and see"—is not keen to; will be "glad to go home" when she leaves.

VOCATIONAL PREFERENCES OF SCHOOL-LEAVERS IN A SCOTTISH INDUSTRIAL AREA¹

BY HELEN PALLISTER

From the Psychological Laboratory, St Andrews

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I. INTRODUCTION

EVERY year thousands of school-leavers in Britain face the problem of entering the ranks of employed workers. The vocational psychologist is interested in knowing for what occupations these juveniles express preferences. The vocational preference, existing as a positive attitude to-

¹ This paper was read to the Psychology Section of the British Association for the Advancement of Science, Blackpool, 1936, as one in a series of *Co-ordinated Social Researches in a Scottish Area*. The first paper in this series, by O. A. Oeser(2), describes the general organization and methods of the researches, which are financed by special grants from the Pilgrim Trust and the Medical Research Council.

ward a certain occupation, is one factor of a pattern in which function together the economic condition and industrial structure of the area, the economic and social status of the juvenile's parents, the mental level, special abilities, personality attributes and interests of the juvenile, his knowledge of, or misconceptions about various occupations, his conscious or unconscious acceptance of a certain role in society, and the attitude of others toward the juvenile. The analysis of the data presented in this paper is both of theoretical and practical importance. It is theoretically interesting to relate the factors of education, personality and interest to the vocational preferences expressed, and to discover whether the juveniles' pattern of preferences coincides with the occupational pattern in the area. It is also important for practice, as these children, and thousands like them, are not mere case numbers in the files of the Ministry of Labour. They are living human beings whose occupational fitness and adjustment are the concern of society and the special problem of vocational psychologists as applied scientists.

II. PURPOSE OF THE INVESTIGATION

This paper is concerned with a statistical analysis of the vocational preferences of 925 juveniles in Dundee. These juveniles, 478 girls and 447 boys, left the central schools of the area in June 1936. The data on which the analysis is based come directly from form E.D. 210 X of the Ministry of Labour. This form consists of a small, four-page leaflet divided into two sections: pp. 1 and 2, filled in by the prospective school-leaver a few weeks before he leaves school; pp. 3 and 4 filled in by the teacher at the same time. The first section supplies, among other information, that concerning:

- (a) first vocational preference of the child;
- (b) second vocational preference;
- (c) intention of attending evening continuation classes;
- (d) club membership;
- (e) interests and hobbies.

The second section will not be considered in any detail in this paper. The only information from it which has been analysed is that concerning the educational status of the child. The educational status of the child as given on form E.D. 210 X was later checked against the official list of school certificates awarded, and any necessary corrections were made, since it was not possible in all cases for the teacher to predict

correctly whether or not a child would obtain a Day School Lower or Day School Higher Certificate.¹

The sexes have been treated separately. This is essential, as the environment does not always press uniformly on the two sexes. It is particularly important for the vocational psychologist to determine the effect of differential pressure on the juveniles, and also to show how, when common environmental factors exist without differential pressure, the sexes resemble each other in status or behaviour.

III. GIRLS

A. *First vocational preferences*

Table I shows the first vocational preferences of 478 girls. Vocational preference here means the occupation or job which the juvenile writes on the form as the occupation he or she would like to enter.² The concept of vocational preference implies a vocational wish restricted by the individual's conscious or unconscious awareness of environmental or even hereditary factors which circumscribe the range of possible vocational choice. A girl might wish to be an engineer, but never expresses a vocational preference for this occupation, because of the social pattern of this area in which boys may be engineers, but girls are not engineers. For both boys and girls, vocational wishes may be restricted by such factors as the economic conditions of the parents, opportunities for training and social attitudes toward different occupations.

The vocational preferences of girls have been classified in ten occupational categories, shown in Table I:

- (1) mill (mainly jute spinning, but may include spinning of flax or hemp);
- (2) factory (jute, and possibly flax weaving);
- (3) domestic;
- (4) laundry (manual work in commercial laundries);
- (5) preserves (dealing with the making of sweets or the canning of fruits or vegetables);
- (6) printing (e.g. hand colouring cards, tying ribbons, assembling calendars and similar work in printing establishments);

¹ The author gratefully acknowledges the permission granted by the officials of the Ministry of Labour to use their files to obtain the data for this investigation. She also welcomes this opportunity of expressing thanks to her colleagues, E. L. Trist, H. Hillmann, and W. O'D. Pierce, for very considerable aid in transcribing the raw data.

² Question 8 on the form reads: "What kind of work would you most like to have? If you have any *special* reasons for your choice, state them."

- (7) dressmaking;
- (8) shop assistant (including message girl);
- (9) office;
- (10) miscellaneous occupations.

Some of these categories contain very few individuals, but the categories have nevertheless been included in the classification, because these occupations are entered by girls in this area.

Table I. *Girls. First vocational preferences*

Vocational preference	Frequency of preference	% of total
Mill	21	4.4
FACTORY	128	26.8
Domestic	18	3.8
Laundry	10	2.1
Preserves	5	1.0
Printing	6	1.3
Dressmaking	15	3.1
SHOP ASSISTANT	145	30.3
OFFICE	94	19.7
Miscellaneous	36	7.5
Total	478	100.0

Table I shows that the girls have three dominant vocational preferences, which are, in order of decreasing popularity: shop assistant (30.3 %), factory work (26.8 %) and office work (19.7 %). These three occupations together account for 76.8 % of all vocational preferences. It is the writer's opinion that the most popular occupation, namely, shop assistant, appeals to the juvenile because of supposed personal or social advantages not offered by any of the other occupations. The shop assistant can wear more attractive clothes and keep herself neater than the girl in any of the other occupations except the office worker. She has a greater advantage than the other girls, including the office girls, in meeting people, and for small shops high educational attainments are not required as they are for office workers. Until she has had some experience in the work, the juvenile does not seem to see the disadvantages of shop work, such as the long hours, and the possibility of being permanently laid off at the age of 18.

Factory work, the second choice in popularity, also carries with it a prestige value. In this area spinners and weavers now work under conditions that are objectively similar. Yet weaving is considered superior to spinning, although to an outsider both kinds of work appear equally dirty and unpleasant. The prestige value of weaving continues to exist, although one of the original factors at the root of this prestige, better wages for the factory worker, no longer exists. Hence we find that only

4.4 % prefer a mill job, whereas 26.8 % express a preference for factory work.

B. First vocational preferences compared with industries actually entered

The vocational psychologist should know not only the popularity of occupations in the area, but also the distribution of workers in these occupations. It has not been possible in all cases to compare the frequency of vocational preferences directly with the absorptive capacity of the different occupations, because the official figures of the Ministry of Labour report the numbers employed only on an industrial basis. By adding together the number preferring mill and factory work a category is obtained comparable to the industrial categories of jute, flax and hemp. The category of vocational preference known as shop assistant is comparable to the industrial category of distributive trades. Preserves, printing and laundry categories can also be compared with similar industrial categories. Figures for industrial categories comparable to the domestic, dressmaking, office and miscellaneous categories of vocational preference cannot be obtained.

Table II. *Girls.* Comparison of industrial employment, 1936, with first vocational preference*

Industry	Employed workers				First vocational preference	
	Under 16 years of age N = 2749		16-18 years of age N = 2737		14-16 years of age N = 478	
	No.	%	No.	%	No.	%
Jute, flax and hemp industries	1175	42.7	1404	51.3	149	31.2
Distributive trades	446	16.2	565	20.6	145	30.3
Confectionery and other food industries	381	13.8	97	3.5	5	1.0
Printing	209	7.6	96	3.5	6	1.3
Laundry service	52	1.9	42	1.5	10	2.1
Total	2263	82.2	2204	80.4	315	65.9
Other industries	486	17.8	533	19.6	163	34.1
Grand total	2749	100.0	2737	100.0	478	100.0

* The raw figures for employed workers are taken from the official figures of the Ministry of Labour in the area.

Table II shows a comparison of available figures. Important facts brought to light are:

(1) A smaller proportion of girls prefer to enter the jute, flax and hemp industries than the proportion of juveniles employed in these industries. This difference is statistically significant¹.

¹ A difference is considered significant, in this paper, only if the difference between the two percentages divided by the sigma of the difference is 3 or greater than 3.

(2) A larger proportion of girls prefer to enter the distributive trades than the proportion of juveniles employed in these trades. This difference is also significant.

(3) Almost twice as great a proportion of girls prefer to enter 'other industries' as the proportion of workers in 'other industries'.

The general conclusion is that girls' vocational preferences do not vary as the absorptive capacity of the industries in the area. Occupational maladjustment may arise from this situation, since many workers are being forced into the kind of work they do not wish to enter.

Although those employed as shop assistants in this area do not constitute the largest numerical group, the distributive trade is one of the most important trades for juveniles in the country as a whole. Gollan⁽¹⁾ states that "distribution has become the greatest single industry for youth". This statement is based upon figures from the *Ministry of Labour Gazette* for July 1935. For Scotland as a whole, 12% of juveniles were distributive workers at that date. For the girls of the nation as a whole Gollan finds the following industries in order of decreasing number of juveniles employed: distribution, textiles, clothing, food, drink, tobacco, other metal, paper and printing. In Dundee, textiles come first and distribution second in order of the number of female juveniles employed. Together they absorb 58.9% of female workers under 16 years of age, and 71.9% of female workers between 16 and 18 years of age.

C. *First vocational preference in relation to second vocational preference*

Instead of an analysis showing all the second vocational preferences in relation to first preferences, a much simpler analysis has been made. Table III shows for the different occupational groups based on first vocational preference the number and percentage who (a) give no alternative preference, (b) write 'anything', and (c) give a second specific vocational preference.

For the group as a whole nearly half of the children, 49.2%, fail to mention a second specific vocational preference. It is for this reason that no attempt has been made to analyse the classified second vocational preferences in relation to first preferences.

In the column headed 'anything' all first preference groups show a percentage exceeding 16 except the office group. This figure, 3.2%, for the office group points to the definite intentions of this group which has in school received specific vocational training in commercial courses.

Table III. *Girls. First vocational preference in relation to second preference*

First vocational preference	No alternative		'Anything'		Specific second preference		Total	
	No.	%	No.	%	No.	%	No.	%
Mill	4	19.0	8	38.1	9	42.9	21	100.0
Factory	13	10.1	57	44.6	58	45.3	128	
Domestic	2	11.1	8	44.4	8	44.5	18	
Laundry	1	10.0	6	60.0	3	30.0	10	
Preserves	1	20.0	2	40.0	2	40.0	5	
Printing	1	16.6	1	16.6	4	66.8	6	
Dressmaking	3	20.0	4	26.7	8	53.3	15	
Shop assistant	33	22.7	36	24.8	76	52.5	145	
Office	32	34.0	3	3.2	59	62.8	94	100.0
Miscellaneous	8	22.2	12	33.3	16	44.5	36	
Total	98	20.5	137	28.7	243	50.8	478	100.0

There is a significant difference between the percentage of girls giving office work as first choice who state they will take 'anything' as second choice and the percentage of girls naming mill, factory, domestic, laundry, and shop assistant as first choice who state they will take 'anything'. There is also a significant difference between the factory and shop assistant group, the factory group being more willing than the shop assistant group to take 'anything'.

More than one-third of the mill group, more than two-fifths of the factory and domestic groups, and approximately one-quarter of the dressmaking and shop assistant groups are willing, so they state, to try 'anything' if they are unable to obtain their first choice of work. These figures show that for the mill, factory, domestic, laundry and preserves groups less than half the girls name a second specific vocational choice. At least two factors produce this response:

(1) The children in these groups leave school, on the average, at an earlier age than those in the remaining occupational groups. They are therefore not so likely to know the advantages and disadvantages of occupations, or the requirements of different occupations, and hence give no alternative choice or say that 'anything' will suit them.

(2) The economic conditions of their homes make it imperative that they get a job immediately, regardless of the nature of the work. It should be noticed that the percentage of those who say 'anything' for the mill, factory, domestic, laundry and preserves groups is much larger than the percentage of 'no alternatives' for the same groups.

Of the three most popular occupational groups, judged by first choice, office has the largest proportion naming a second specific vocational

choice, next comes shop assistant, and finally factory. The differences in percentages are not, however, completely reliable statistically.

Of the total number of girls who do name a second vocational choice, 105 (22 %) prefer the occupation of shop assistant. Shop assistant is thus the most popular second as well as first choice.

D. *First vocational preference in relation to education*

(1) *Educational status.* By educational status is meant one of the following. The child:

(a) has been in a class for retarded pupils because of physical or mental defects—Retarded group;

(b) is supposedly normal, but is leaving school without a certificate—Normal group;

(c) has obtained a Day School Lower Certificate but no higher certificate—D.S.L. group;

(d) has obtained a Day School Higher Certificate—D.S.H. group.
[D.S.L. certificates are awarded for satisfactory scholastic attainment in central schools, usually at the age of 14. D.S.H. certificates are awarded as the result of special examinations and are obtainable one year after the D.S.L.]

Of the total group the children who obtain a D.S.L. but no higher certificate comprise 27·8 % (see Table IV). The D.S.H. category comprises 16·1 %. There are 37·9 % in the Normal and 18·2 % in the Retarded category. If the numbers in the D.S.H. and D.S.L. categories are combined to find the total percentage of children who leave school with at least a D.S.L. Certificate the figure is found to be 43·9 %. All holders of a D.S.H. must have previously obtained a D.S.L.

Table IV. *Girls. First vocational preference in relation to education*

Vocational preference	Educational status										Intention of attending continuation classes	
	Retarded		Normal		D.S.L.		D.S.H.		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Mill	11	52.4	8	38.1	2	9.5	0	0.0	21	100.0	6	28.6
Factory	35	27.3	54	42.2	39	30.5	0	0.0	128		28	21.9
Domestic	9	50.0	5	27.8	4	22.2	0	0.0	18		6	33.3
Laundry	4	40.0	5	50.0	1	10.0	0	0.0	10		3	30.0
Preserves	1	20.0	2	40.0	2	40.0	0	0.0	5		1	20.0
Printing	1	16.7	3	50.0	2	33.3	0	0.0	6		4	66.6
Dressmaking	2	13.3	10	66.7	2	13.3	1	6.7	15		6	40.0
Shop assistant	12	8.3	63	43.5	60	41.3	10	6.9	145		76	52.4
Office	0	0.0	17	18.1	14	14.9	63	67.0	94	91	96.8	
Miscellaneous	12	33.3	14	38.9	7	19.5	3	8.3	36	13	66.1	
Total	87	18.2	181	37.9	133	27.8	77	16.1	478	100.0	234	48.9

Consider the four educational categories separately, again. Several points should be noted. Not until the dressmaking group is reached does anyone appear with a D.S.H. Of the shop assistant group a small percentage have a D.S.H. Of the office group 67.0 % have a D.S.H. These 63 girls constitute 81.8 % of the 77 girls who obtain a D.S.H. They are intellectually the *élite* of this school population. However, it should be remembered that a number of children are obliged to leave school before they have had the necessary training to take the examination.

In all the occupational groups some children have a D.S.L. Mill (9.5 %) and laundry (10 %) have few D.S.L. pupils, whereas factory (30.5 %), printing (33.3 %), shop assistant (48.2 %) (41.3 + 6.9) and office (81.9 %) (67 + 14.9) embrace increasingly larger numbers of pupils with a D.S.L. at least. The office significantly exceeds all other groups. In all occupational groups, with the exception of the office group, from 27.8 to 66.7 % of the pupils are Normals with no certificate. Of the office group only 18.1 % have no certificate. With regard to the Retarded category, of the mill group 52.4 % are retarded, whereas no one in the office group is placed in this educational category. Spinning is not only unpopular as an occupation, but more than half of those who express a preference for it are retarded because of either physical or mental defects. Of the domestic group, half are also retarded. The printing, dressmaking and shop assistant groups show progressively small percentages of retarded pupils in them. The shop assistant and office groups differ significantly from the mill, factory and domestic groups in having a smaller percentage of retarded pupils in them.

A relationship thus appears between first vocational preference and educational status. It appears most markedly if the highest and lowest categories of educational achievement are considered in relation to vocational choice. Those who express a preference for occupations of a high prestige value have higher educational attainment, as a group, than those choosing a job lower in social prestige.

(2) *Continuation classes.* Table IV also shows the relation of first vocational preference to intention of attending continuation classes. The average for the total group of 478 girls is 48.9 %. This figure is almost double that given by Gollan⁽¹⁾ as the percentage of school-leavers who actually begin evening continuation classes. Gollan sets the percentage of entrants to continuation classes at 25.

The various occupational preference groups show a marked difference in the percentage of those who state that they intend to attend such classes. One third or less of the mill, factory, domestic and preserves groups plan to attend continuation classes. The dressmaking, shop

assistant, miscellaneous, printing and office groups, in order of increasing percentages, plan to attend these classes. The office group stands out again as intellectually superior. Not only is it characterized, on the one hand by no retarded members, and on the other hand by the greatest number with D.S.H. certificates, but also by the greatest number planning to continue their education. In part, at least, economic factors explain these differences. Girls leaving at 14 years of age who require an immediate job, realistically pick one that does not make any great demands upon ambition, a good educational status or further training. Those leaving with a better education know that financial promotion comes more easily to those who continue to excel in educational competition with others. Thus girls planning to enter shops learn that the better shops, where at least they will secure greater prestige, demand girls with a D.S.H. Those planning to enter clerical posts know that they will fare better if they take the Chamber of Commerce Examination. It is also true that the girls who remain at school to get a D.S.H. are more interested in school work than pupils who voluntarily leave school at 14, even when a job is not urgently required. Hence these better educated groups plan to continue their education further in evening classes.

E. *First vocational preference in relation to club membership*

The figures for club membership in relation to first vocational preference are as follows: Of the total group, 42 % are club members. The domestic and printing groups have the lowest percentage of club members of any of the occupational groups—only 16·7 % each. The mill group is also low with only 23·8 % who are members of clubs. The shop assistant and office groups exceed the average of the total group in membership (43·3 % and 56·4 % respectively). The only differences in percentages of club members which are significant are those between the mill and the office groups, and between the domestic and the office groups. The most striking feature about these figures is not the relation of club membership to type of job preferred, but the small number of club members in each of the occupational preference groups. This phenomenon may be explained by one or both of the following factors:

(a) Economic. Clubs cost money.

(b) Cultural. In this area socially organized and integrated groups are not much encouraged within the school system. For example, in one large central school, the only existing clubs are football clubs for boys, the orchestra and the choir. No athletic clubs exist for girls. There are no literary, dramatic, debating, science or nature study clubs such as are common in schools elsewhere. It is felt by the headmaster of this school

that the pupils in central schools are too young for an extensive system of clubs to be developed.

That club activities on school premises are not frequent is also shown by the fact that the gates of the school grounds are locked soon after four o'clock, the time when day classes at the school end.

F. *First vocational preference in relation to interests*

Table V shows the figures for nine classified interests in relation to vocational preference. For each individual in each of the various occupational preference groups only the number of different kinds of interests mentioned have been recorded. Thus, although a girl may have mentioned three different sports which she likes, but only one kind of sewing, her interest in athletics is recorded only once as is her interest for sewing. The nine classified interests are: athletics, music, sewing, etc. (including embroidery, knitting and crocheting), domestic activities (such as cooking and housekeeping), art, reading, collecting, miscellaneous interests, and no interests.

The figures at the bottom of the table show that there are three dominant kinds of interests among girls: athletics, sewing, etc., and reading, in decreasing order of importance. All the other interests are very infrequent.

Now compare the occupational preference groups by interests. First, the average number of interests, given in the column headed *A/B* is low for the laundry, miscellaneous and factory groups. It is the highest for the printing and office groups, but not even for these groups does the average number of interests reach three. [This is to be expected in view of the fact that only three dominant interests are to be found in the total group of girls.] A few individuals in all groups, except the laundry and dressmaking groups, both small groups, fail to mention any interests, although it is psychologically improbable that these individuals are really lacking in interests outside their school work. It is more likely that their interests may be ones which they are not so ready to admit while in school, interests such as the cinema. All the recorded interests of the girls are such that they would meet with the approbation of the school authorities or are vocationally desirable. Thus it seems that the school environment, and the fact that form E.D. 210 X, after being filled in, is submitted to the school authorities, directly influence the enumeration of interests. Here we see the potent effect of one institution in conditioning the interests and/or the expression of interests of those coming under its control.

Table V. *Girls. First vocational preference in relation to interests*

Vocational preference	Athletics		Music		Sewing		Domestic activities		Art		Reading		Col-lecting		Miscellaneous activities		None		Total in occupational group	A/B
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	A	B
Mill	8	38.1	0	0.0	11	52.4	5	23.8	1	4.8	3	14.3	0	0.0	1	4.8	1	4.8	30	21
Factory	61	47.7	2	1.7	44	34.4	15	11.7	3	2.3	30	23.4	2	1.7	3	2.3	12	9.4	172	128
Domestic	8	44.4	0	0.0	8	44.4	3	16.7	0	0.0	8	44.4	0	0.0	1	5.6	2	11.1	30	18
Laundry	6	60.0	0	0.0	2	20.0	0	0.0	0	0.0	4	40.0	0	0.0	1	10.0	0	0.0	13	10
Preserves	2	40.0	1	20.0	3	60.0	0	0.0	0	0.0	1	20.0	0	0.0	1	20.0	1	20.0	9	5
Printing	3	50.0	0	0.0	2	33.3	0	0.0	2	33.3	4	66.7	0	0.0	1	33.3	1	33.3	13	6
Dressmaking	8	53.3	3	20.0	8	53.3	0	0.0	0	0.0	5	33.3	2	13.3	0	0.0	0	0.0	26	15
Shop assistant	88	60.6	5	3.5	58	40.0	9	6.2	3	2.1	60	41.4	1	0.7	3	2.1	11	7.6	238	145
Office	63	67.0	29	30.9	39	41.5	0	0.0	1	1.1	62	66.0	12	12.8	8	8.5	5	5.3	219	94
Miscellaneous	15	41.7	1	2.8	13	36.1	2	5.6	2	5.6	6	16.7	0	0.0	5	13.9	3	8.3	47	36
Total	262	54.8	41	8.6	188	39.3	34	7.1	12	2.5	183	38.2	17	3.6	24	5.0	36	7.5	797	478

The percentages read horizontally show the percentage of individuals recording an interest in each occupational group. These interests are treated as independent variables. Therefore, since an individual may have more than one interest, the percentages read horizontally do not total 100.0 %.

The pattern of interests differs somewhat for the different occupational groups. All groups show the three dominant interests to some extent, but in varying proportions. However, only in reading does any reliable difference of interest exist between the occupational groups. The shop assistant group is more interested in reading than either the mill or factory groups, and the office group is more interested in reading than the mill, factory, dressmaking or shop assistant groups. These differences are in accord with expectation. The mill group, which has the lowest percentage of girls interested in reading, has the highest proportion of retarded pupils in it, whereas the office group, and to a less extent the shop assistant group, have a high proportion of well-educated individuals in them. Also this interest is indirectly related to occupational adjustment. The necessity for dealing with verbal symbols is unimportant for a girl intending to enter a mill or a factory, whereas it is an essential part of the daily routine of an office girl, and is also necessary for the shop assistant.

Some of the recorded interests seem not to accord so well as the above examples with the vocational preference expressed by the child. Of those in the domestic group only 16.7 % mention such interests as cooking and housekeeping, which are classified under the head of domestic interests in the table. This, coupled with the fact that a large proportion, 50 %, of the girls in this group are retarded, points to an unwise choice of occupation. It is rather surprising, too, that only 53.3 % of the dressmaking group mention an interest in sewing. The fact that 30.9 % of the office group mention music as an interest is quite striking. Actually, these twenty-nine girls in the office group constitute 70.7 % of the group of 41 girls who list music among their interests. Music as a cultural interest is probably related here to the superior socio-economic status of homes from which girls in the office group come. These are girls whose parents can afford to keep them in school until they obtain a fair commercial training. We may suppose, therefore, that money for such cultural advantages as music is more readily available in the homes of these girls. The monetary factor cannot, of course, be the whole explanation, but it is still true that the interests of those with aptitude for music is strengthened through musical education.

IV. Boys

A. *Vocational preferences*

The same analyses are made for boys as for girls, except that the relation of industrial employment to vocational preferences, and the relation of first to second vocational preference, have not been analysed.

Table VI presents an analysis of the classified vocational preferences of boys. Whereas the girls mention only twenty-six jobs which are readily classified into ten occupational categories, the boys mention

Table VI. *Boys. Vocational preferences*

Vocational preference	Frequency of preference	% of total
Unskilled	74	16.6
Semi-skilled	35	7.8
Total	109	24.4
Skilled trade:		
Distributive	40	8.9
Transport	26	5.8
Building	79	17.7
Furnishing	4	0.9
Engineering	84	18.8
Miscellaneous	28	6.3
Total	261	58.4
Business	40	8.9
Professional	12	2.7
Total	52	11.6
Miscellaneous unclassifiable	25	5.6
Grand total	447	100.0

seventy-eight jobs. This restriction of the vocational preferences of the girls is a very interesting phenomenon. Environmental pressure is continuously bearing on females, forcing them into narrow vocational channels. Women who wish to enter 'men's jobs' are frowned upon, refused for such jobs, or admitted grudgingly at wages lower than those paid to men. The effect of this pressure has been so marked even on the girl no older than 14 or 16 years of age that she responds positively, as indicated by the preferences expressed, to only one-third of the number of jobs to which a boy responds.

Because of the large number of occupations which boys mention it has been necessary to group these occupations differently from the classification for girls. Boys' preferences have therefore been classified as: unskilled, semi-skilled, skilled, under which are six subheadings; then business, clerical posts, professional (which also includes semi-professional occupations), and miscellaneous unclassifiable occupations. The most popular class of occupation is the skilled trade group. Of all the boys, 58.4 % mention one or another of the skilled trades. In this area only approximately 10 % of boy workers (250 out of 2547) actually entered an apprenticeship in 1936. A significant difference exists therefore between the number who wish to enter a skilled trade and the number of those who are eventually accepted for one.

Of the skilled trades, engineering ranks first in popularity, with building a close second. The next highest percentage occurring in the table is 16.6 %, the figure for those mentioning some occupation of an unskilled kind (such as railway cleaner, sawmill, lodge boy, etc.). Some of these boys intend to take up other work later, but as no other preference has been stated the only job mentioned as the boy's preference has had to be accepted. Ambiguity arises here in the interpretation of the vocational preferences written on the form. Boy's first and second vocational preferences cannot be clearly distinguished as they are for girls. Therefore a table showing the percentage of second vocational preferences in relation to first preference is not given. It is the apprenticeship system with the pre-apprenticeship years, 14-16 years of age, taken up in temporary work, that renders any clear distinction between first and second preferences for boys impossible. Whenever a boy mentions an apprenticeship as his goal at the age of 16, this is classified as his vocational preference, although on the line calling for first vocational preference he may have written the name of a temporary job, such as errand boy.

Further differences between the kinds of jobs chosen by boys and girls are now apparent in the nature and length of training required to fit a person for the job. Of the boys, 58.4 % wish to enter an apprenticeship. While it should be noted that the length of time spent in an apprenticeship to-day bears no direct relation to the number or complexity of the skills acquired during the training period, nevertheless the trained apprentice does acquire numerous skills not possessed by him at the time he leaves school. Even more important is the fact that he has prospects of advancement. In the case of all the occupations which the central school girls choose to enter, the training period is relatively short. Furthermore it is not intended that a girl should acquire such technical knowledge of the job at which she works as a boy would acquire. For example, no matter how skilled a girl weaver may become, she is not expected to understand the treatment of jute for various industrial purposes, nor is she required to master the theory or practical mechanics of her loom. Therefore, although a boy may advance from apprentice tenter (mill mechanic) to manager of a works, the girl remains a weaver all her life.¹

¹ Because of the greater diversity of occupations which boys as compared with girls enter, and the differences in skill required in various occupations within the same industry, it has not been possible to compare industrial employment of boys with their vocational preferences. Figures for industrial employment give no clue to whether the boy is doing unskilled or semi-skilled work, or whether he is a skilled apprentice or clerical worker.

B. *Vocational preference in relation to education*

Table VII shows boys' vocational preferences in relation to educational status and intention of attending continuation classes.

Table VII. *Boys. Vocational preference in relation to education*

Vocational preference	Educational status									Intention of attending continuation classes		
	Retarded		Normal		D.S.L.		D.S.H.		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Unskilled	22	29.7	41	55.4	9	12.2	2	2.7	74	100.0	18	24.3
Semi-skilled	12	34.3	21	60.0	0	0.0	2	5.7	35		4	11.4
Skilled trade:												
Distributive	2	5.0	22	55.0	12	30.0	4	10.0	40		27	67.5
Transport	0	0.0	15	57.7	7	26.9	4	15.4	26		16	61.5
Building	17	21.5	32	40.5	25	31.6	5	6.4	79		39	49.4
Furnishing	0	0.0	3	75.0	1	25.0	0	0.0	4		2	50.0
Engineering	8	9.5	45	53.6	21	25.0	10	11.9	84	59	70.2	
Miscellaneous	4	14.2	9	32.2	8	28.6	7	25.0	28	16	57.1	
Total	31	11.9	126	48.2	74	28.4	30	11.5	261		159	60.9
Business	0	0.0	3	7.5	3	7.5	34	85.0	40	100.0	38	95.0
Professional	1	8.3	0	0.0	1	8.3	10	83.4	12		10	83.3
Miscellaneous unclassifiable	7	28.1	18	71.9	0	0.0	0	0.0	25		7	28.0
Grand total	73	16.3	209	46.7	87	19.5	78	17.5	447	100.0	236	52.8

(1) *Educational status.* The categories of educational status are the same as for girls. There are no significant differences between the total number of boys and girls in the four educational categories: Retarded, Normal, D.S.L., D.S.H.

It is very important to notice that of the total skilled trade group only 11.5% obtain the D.S.H. A large percentage of boys, therefore, not only expresses a preference for occupations in which there are few openings, but also wishes to enter these occupations without adequate education. The question of evening continuation classes to bring these boys up to the necessary educational standard will be considered presently. Within the skilled trade group 25% is the highest percentage of those having a D.S.H. A few in the unskilled and semi-skilled groups have a D.S.H. These figures, 2.7 and 5.7% respectively, probably indicate not so much lack of ambition on the part of these boys as failure to state the life occupation they prefer. The highest percentage of boys holding the D.S.H. occurs in the professional group, 85, and in the business group, 83.4. If we add to those figures those for boys in the D.S.L. category we find that of boys planning to enter business 92.5% have at least a D.S.L., and of the professional group, 91.7% have obtained this certificate at

least. Within the skilled trade group only approximately 40 % of the boys have at least a D.S.L. For some trades the percentage is lower.

Of the group of normal boys with no certificate the largest percentage occurs in the semi-skilled group. Even in the skilled trade group, however, from 32.2 to 75 % normals are without certificates. These percentages are far too high for boys hoping to enter a skilled trade. Of those wanting to enter business only 7.5 % are normals without a certificate; of the professional category no one is a normal without a certificate, but one boy is a retarded pupil. This retarded boy, regardless of the causal factor in his retardation, has no chance of entering work of a professional nature. The percentages in the skilled trade group of boys who are retarded again emphasize the failure of boys in this group to attain the required educational standards.

It is clear that the majority of these school leavers do not express a preference for occupations for which they are educationally prepared. There is a smaller discrepancy between the educational status and the educational requirements of the occupations preferred by the girls than there is for the boys, because the occupations preferred by the girls do not, on the whole, demand high educational qualifications.

(2) *Continuation classes.* Since the majority of boys need further education to fit them for the occupations they want to enter, examine now the figures for those intending to attend continuation classes. Even if all the boys in the skilled trade group who state that they intend to attend continuation classes actually do so, those who have not got certificates when they leave school will not all obtain them at the continuation school. 88.5 % of the skilled trade boys have not got a D.S.H. Only 60.9 % of the group plan to attend continuation classes. Some of these will be undoubtedly boys who already have the D.S.H., and many boys who attend the classes will fall out during the year.

The two vocational preference groups having the highest percentage of boys with D.S.H. certificates are also the ones with the highest percentage intending to attend continuation classes. Of the business group, 95 % intend to attend such classes, and of the professional group 83.3 %. The engineering group with 70.2 % ranks next. Of the total number of boys, 52.8 % state that they plan to attend continuation classes. This figure slightly but not significantly exceeds the percentage for girls, 48.9.

C. Vocational preference in relation to club membership

With regard to the club membership of boys, the figure for all the boys, 40.1 %, does not differ significantly from that for girls, 42.0 %. There is no vocational preference group without some club members in it. This is as true for boys as it is for girls. The smallest percentage is found in the unskilled group, 25.7. The largest percentage is found in the professional group, 58.3. Of those in the business group, 52.5 % are club members. The differences between these groups are however not significant. There is not therefore any clear relation between the occupational level and club membership nor between club membership and the nature of the job, i.e. whether the job involves dealing mainly with people or with things.

D. Vocational preference in relation to interests

Table VIII shows boys' interests classified in relation to vocational preference. The classification of interests is similar for boys and girls. The domestic and sewing interests of girls do not appear in the boys' table, but instead there are woodwork and engineering interests. For boys the chief interest is athletics. The cycling interest belongs in the same category as the other sports. It is put into a category by itself, because in addition to being a sport, it serves the function of equipment for a beginner's job in the distributive trades. It is interesting to notice, in this connexion, that less than one-third of the boys who mention the distributive trade as their vocational preference have an interest in cycling. Of course, a boy may be able to cycle, and therefore obtain a job as a message boy, without having any great interest in cycling as an activity.

It is interesting to compare the interests of boys and girls. For girls, besides athletics, there are two other interests of considerable popularity, i.e. sewing and reading. Aside from athletics, other interests of boys are infrequently reported. Only 11.4 % of boys express an interest in reading. For girls the percentage is 38.2, and reading is the third most popular interest. This difference between the percentage of boys and girls interested in reading is statistically reliable. Among boys the professional group is the most interested in reading, but the percentage for this group, 16.7, exceeds only slightly that for the mill group of girls, 14.3, and the mill group shows less interest in reading than any of the other groups of girls. The fact that girls mature before boys may be one explanation of girls' greater interest in reading. Also the adult emphasis

Table VIII. Boys. Vocational preference in relation to interests

Vocational preference	Cycling		Athletics		Wood-work		Engin-eering		Music		Art		Reading		Col-lecting		Miscel-laneous		None		Total in no. of occu-pational interests		A/B
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	A	B	
Unskilled	28	37.8	42	56.8	3	4.1	1	1.4	0	0.0	2	2.7	5	6.8	3	4.1	4	5.4	12	16.2	100	74	1.35
Semi-skilled	10	28.6	22	62.9	2	5.7	1	2.9	0	0.0	1	2.9	4	11.4	2	5.7	1	2.9	8	22.9	51	35	1.46
Skilled trade:																							
Distributive	13	32.5	22	55.0	5	12.5	1	2.5	5	12.5	3	7.5	5	12.5	5	12.5	1	2.5	1	2.5	61	40	1.53
Transport	10	38.5	13	50.0	3	11.5	0	0.0	2	7.7	0	0.0	4	15.4	1	3.9	2	7.7	6	23.1	41	26	1.58
Building	27	34.2	36	45.6	12	15.2	1	1.3	1	1.3	1	1.3	9	11.4	4	5.1	3	3.8	11	13.9	105	79	1.33
Furnishing	2	50.0	3	75.0	0	0.0	0	0.0	1	25.0	0	0.0	0	0.0	0	0.0	0	0.0	1	25.0	7	4	1.75
Engineering	37	44.1	48	57.1	11	13.1	8	9.5	2	2.4	3	3.6	11	13.1	6	7.1	11	13.1	9	10.7	146	84	1.74
Miscellaneous	11	39.3	25	89.3	4	14.3	1	3.6	1	3.6	1	3.6	3	10.7	3	10.7	4	14.3	1	3.6	54	28	1.93
Total	100	38.3	147	56.3	35	13.4	11	4.2	12	4.6	8	0.3	32	12.3	19	7.3	21	8.0	29	11.1	414	261	1.59
Business	6	15.0	28	70.0	2	5.0	2	5.0	6	15.0	3	7.5	6	15.0	8	20.0	8	20.0	3	7.5	72	40	1.80
Professional	2	16.7	3	25.0	4	33.3	1	8.3	2	16.7	2	16.7	2	16.7	4	33.3	1	8.3	0	0.0	21	12	1.75
Miscellaneous unclassifiable	1	4.0	12	48.0	0	0.0	1	4.0	0	0.0	0	0.0	2	8.0	1	4.0	1	4.0	5	20.0	23	25	0.96
Grand Total	147	32.9	254	56.8	46	10.3	17	3.8	20	4.5	16	3.6	51	11.4	37	8.3	36	8.0	57	12.8	681	447	1.53

There are no significant differences between the occupational groups in the percentage of juveniles expressing an interest in athletics or any other activity.

See also footnote Table V.

on sports for boys may explain in part their concentration on this one type of interest.

Although only a small percentage of boys is interested in collecting, nevertheless the percentage for this interest, 8.3, is significantly greater than the percentage for girls, 3.6.

For boys the greatest average number of interests for any occupational group given in the column, *A/B*, is 1.93 for the miscellaneous skilled trade group. The business and professional groups are next highest, 1.80 and 1.75 respectively. None of the boys' vocational groups reaches or exceeds the figure, 2.33, for the office group of girls. This again shows the greater concentration of interest among the boys and the greater diversity among girls.

V. SUMMARY

(1) *Problem and procedure*

The vocational preferences of 925 juveniles, 478 girls and 447 boys, as recorded on form E.D. 210 X of the Ministry of Labour, are classified in categories based on occupational preference. These juveniles left the central schools of Dundee in June 1936. The sexes are treated separately. Raw figures and percentages are shown for each category of vocational preference.

Groups based on the various categories of vocational preferences are studied in relation to educational status, intention of attending continuation classes, club membership, and classified interests. Raw figures and percentages of these variables are reported for each category of vocational preference. For girls, analyses of industrial employment in relation to vocational preference and of second vocational preferences in relation to first preferences are also reported. Where a group is referred to as mill, office, skilled trade, etc. this means that it is a group based on the first preference of the individuals in the group for mill work, office work, or a skilled trade.

(2) *Results*

A. *Vocational preferences.* (1) Boys name three times as many jobs as girls and different jobs. Therefore the classification of boys' vocational preferences differs from that of girls. The first vocational preferences of girls are classified in the following ten categories: Mill, Factory, Domestic, Laundry, Preserves, Printing, Dressmaking, Shop Assistant, Office and Miscellaneous. The vocational preferences of boys are classified as follows: (1) Unskilled; (2) Semi-skilled; (3) Skilled Trade: (a) Distributive, (b) Transport, (c) Building, (d) Furnishing, (e) Engineering,

(f) Miscellaneous; (4) Business; (5) Professional; (6) Miscellaneous unclassifiable.

(2) The three most popular vocational preferences of girls are shop assistant (30.3 %), factory (26.8 %), and office (19.7 %), in order of decreasing popularity.

(3) The most popular class of occupation among boys is the skilled trade category (58.4 %). Within this category, engineering is the most popular and building a close second.

B. Industrial employment in relation to vocational preference. (1) The frequency of occupational choices does not vary as the absorptive capacity of the industries in the area. A smaller proportion of girls prefers to enter the jute, flax or hemp industries than the proportion of female juveniles employed in these industries. A larger proportion of girls prefers to enter the distributive trades than the proportion of female juveniles employed in these trades. Other discrepancies also exist.

(2) A similar comparison for boys cannot be made from the available industrial figures. It has been shown, however, that 58 % of boys prefer to enter skilled manual trades whereas in 1936 only 10 % of the number of employed juveniles entered such apprenticeships.

C. First vocational preference in relation to second preference (girls).

(1) 20.5 % give no alternative vocational preference. 28.7 % write 'anything' will suit them if they do not get work in line with their first vocational preference. This gives a total of 49.2 % who fail to name a second specific vocational preference.

(2) There is a significant difference between the percentage of girls preferring office as first choice (3.2) who state as second choice that they will take 'anything' and the percentage who prefer the following as first choice: mill (38.1), factory (44.6), domestic (44.4), laundry (60.0), and shop assistant (24.8).

(3) The factory group also significantly exceeds the shop assistant group in the percentage of girls willing to take 'anything' as a second choice of work.

(4) Explanations for these group differences are given in terms of knowledge and economic factors.

D. Educational status. (1) The juveniles are classified in one of the following four categories of educational status: (1) Retarded, (2) Normal (without a certificate), (3) D.S.L. (pupils with a Day School Lower Certificate), and (4) D.S.H. (pupils with a Day School Higher Certificate).

(2) Discrepancies exist between the educational level attained by individuals preferring popular occupations and the educational require-

ments of these occupations. These discrepancies are more marked for boys than for girls.

(3) Occupational preference groups highest in social prestige (office for girls, business and professional for boys) are characterized by a higher percentage of well-educated individuals, as judged by presence of certificate holders and absence of retarded pupils, than are occupational groups lowest in social prestige (mill for girls, unskilled and semi-skilled for boys).

(4) There are no significant differences between the percentages of boys and girls who are Retarded (girls 18.2, boys 16.3), Normal (girls 37.9, boys 46.7), D.S.L. (girls 27.8, boys 19.5), and D.S.H. (girls 16.1, boys 17.5).

E. *Continuation classes.* (1) A significantly larger percentage of juveniles preferring occupations highest in social prestige intend to attend continuation classes than of juveniles preferring occupations lowest in social prestige.

(2) Boys preferring to enter skilled trades do not intend to attend continuation classes in sufficient numbers to bring the group as a whole up to the required educational level for entrance to apprenticeships.

(3) There is no significant difference between the percentage of boys (52.8) and girls (48.9) intending to attend continuation classes.

F. *Club membership.* (1) In general, no significant relationship exists between membership in a club and vocational preference. Girls in the office group are the only exception. There is a significantly greater proportion of club members in the office group (56.4 %) than in the mill (23.8 %) or domestic (16.7 %) groups.

(2) No significant difference exists between the percentage of boys (40.1) and girls (42.0) who are club members.

G. *Interests.* (1) Boys and girls in general mention the same types of interests. Boys, however, mention woodwork and engineering not mentioned by girls, and girls mention sewing and domestic work not mentioned by boys. The other categories of interests are: athletics, music, art, reading, collecting, miscellaneous and no interest.

(2) Girls have three major interests: athletics, sewing and reading. Boys have only one chief interest, athletics.

(3) Both boys' and girls' recorded interests are such as to meet with the approbation of school authorities.

(4) In general no significant differences exist between the interests of the different groups based on vocational preferences. One exception is the reading interest of girls. Girls in the shop assistant and office groups

are significantly more interested in reading than girls in the mill or factory groups. The office group also exceeds the dressmaking and shop assistant groups in interest recorded in reading. Interest in reading is vocationally important for work in offices and shops.

(5) In some groups recorded interests point to an unwise vocational preference. Only 16·7 % of the domestic group and 53·3 % of the dress-making group mention an interest in domestic activities or sewing respectively. Among boys, only 9·5 % of the engineering group record an interest in engineering as a hobby; only 15 % of the business group and 16·7 % of the professional group record an interest in reading.

(6) Girls are significantly more interested in reading than are boys. Boys exceed girls in the interest expressed in collecting, but the percentages of both sexes who mention collecting are small.

VI. CONCLUSION

The findings reported in this paper throw light upon some important aspects of juvenile life which are essential to vocational psychology. Shortcomings in the data are, in all probability, apparent to the reader as well as to the author. For example, the classification of vocational preferences, while designated as an occupational classification, is, in fact, partly occupational, partly industrial and partly a classification based on the range of skills required. Admittedly, it is not a scientific classification. Similar criticisms can be brought against the classification of other variables discussed above.

It has been the aim of this paper to set forth as adequately as possible whatever facts, relationships and psychological implications emerge from the available data. It must not be supposed that a psychologist would gather the original data as the Ministry of Labour is at present gathering it. Although relevant to this paper, a full criticism of form E.D. 210 X cannot be attempted here.

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THE ULTIMATE BASIS OF AESTHETIC EXPERIENCE¹

By W. R. D. FAIRBAIRN

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I. INTRODUCTION

THE present paper may be regarded as the sequel to a paper entitled "Prolegomena to a Psychology of Art", which I contributed to this *Journal*⁽¹⁾. There I pointed out that, whilst no psychology of art could be regarded as complete unless it were based upon the study of both the artist and the beholder,² nevertheless artistic activity can occur, theo-

¹ Based on a paper read before the Scottish Branch of the British Psychological Society on 29 January 1938.

² The term 'beholder' is employed throughout this paper to signify "*the subject of aesthetic experience*". Although the argument is developed with special reference to pictorial forms of art, it is intended to apply to every form of art quite irrespective of the particular sense department involved. The term 'beholder' is now chosen in preference to the wider term 'percipient', which appeared in my former paper, to signify a percipient who is undergoing aesthetic experience.

retically at least, in the absence of any beholder, and that, therefore, the psychological problems of art can be approached with profit only by way of the psychology of the artist. Adopting this path of approach and taking into account the results of recent psycho-analytical research, I proceeded to consider the significance of the work of art as a product of artistic activity. In the present paper I shall pass from the psychology of the artist to the psychology of the beholder and consider the significance of the work of art as a source of aesthetic experience. The argument will, however, presuppose the conclusions of the earlier paper.

II. UNWARRANTED ASSUMPTIONS IN AESTHETICS

In my former paper I provided a background for the present attempt to determine the nature of aesthetic experience. The importance of such a background is not difficult to appreciate, when we consider the confusion which reigns in aesthetics, both as to what constitutes a work of art and as to what is implied in the conception of 'the beautiful'. Owing to its misleading associations, the term 'aesthetics' must itself be regarded with suspicion. The term is now employed almost exclusively in the secondary meaning for which Baumgarten is responsible⁽²⁾, and which is defined in *The Shorter Oxford English Dictionary* as "The philosophy of taste, or of the perception of the beautiful". Such a definition provides an interesting example of the presence of unwarranted assumptions in aesthetics. According to the definition, it will be noticed, 'taste' is equated with 'the perception of the beautiful'. Herein lie two assumptions: (1) that 'the beautiful' is something objective, which has only to be perceived to give rise to aesthetic experience; and (2) that it is the necessary function of a work of art to be beautiful. These, however, are assumptions which can hardly be allowed to pass unchallenged; for they present us with the alternative of either denying the status of 'work of art' to all such professed products of artistic activity as are not universally acknowledged to be beautiful, or of so modifying the conception of 'the beautiful' as to enable products of artistic activity, about which there is no such consensus of opinion, to be admitted to this category. The fact is, of course, that there is no general agreement as to what is beautiful; and consequently standards of beauty provide no criterion of what constitutes a work of art. It is only when we seek our clue to the psychological significance of art in artistic activity (i.e. in the motives of the artist) that it becomes possible to establish a definite criterion by which to differentiate between what is a work of art and what is not. Such a criterion is to be

found, however, in the conclusion reached in my previous paper that anything that is 'made for fun' is a work of art. This conclusion, together with the conclusion that the work of art represents a tribute of restitution paid by the artist's ego to his super-ego, provides a means of surmounting the difficulties inherent in prevalent conceptions in aesthetics.

III. THE BEAUTIFUL IN ART AND IN NATURE

Before we proceed further, it seems desirable to make some attempt to clarify the relationship between the beautiful in art and the beautiful in nature. The phenomena of nature, to which we commonly ascribe beauty, are not, of course, works of art in the ordinary sense. Nevertheless, it is interesting to note how generally the presence of beauty in nature has been cited in support of the teleological argument for the existence of God. The beautiful in nature always gives the impression of something that does not depend simply upon the operation of natural laws, something that is not absolutely necessary, something that is *added* to natural phenomena. In other words, it gives the impression of something that is there 'for fun'. Here we are reminded of the definition reached in my previous paper, that anything that is made for fun is a work of art. It would appear, accordingly, that, if the beholder does not regard every work of art as 'beautiful', he nevertheless tends to regard everything 'beautiful' as a work of art.

IV. THE WORK OF ART AS A 'FOUND OBJECT'

This conclusion provides a convenient starting-point for the investigation of one of the later developments of Surrealism—a development following the invention by Dali of what is described as 'the surrealist object'. (A special Exhibition of Surrealist objects was held in London in the autumn of 1937.) Surrealist objects are defined by David Gascoyne (3), p. 108) as "objects functioning symbolically". These objects are for the most part constructed by the artist out of a strange medley of materials, which appear to him significant. One such object constructed by Dali consisted in a hairdresser's bust of a woman, from whose neck two Indian corn cobs were suspended by means of a collar, and upon whose head was laid a loaf of French bread surmounted by a metal inkstand representing Millet's *Angelus*. This Surrealist object is illustrated, under the title of "Retrospective Bust", by André Breton (4). According to Gascoyne, "These objects typify the more recent ideas of surrealism,

which conceive super-reality as existing in the material world, objectively, as well as subjectively in the automatic thought of the unconscious" (3), p. 109). In the light of this statement, it is easy to understand the next development of Surrealism, which consisted in an enlargement of the conception of 'the surrealist object' such as to enable it to include so-called 'found objects'. The 'found objects' of the Surrealist consist in external, and for the most part natural, objects, in the appearance of which he discovers a hidden symbolic significance, and which he therefore preserves and, so to speak, 'frames'. They represent to those who 'discover' them a union between the world of outer reality and the inner world of the dream; and in virtue of this fact they are regarded as possessing a certain 'super-reality', which obviously resides in their capacity to act as symbols of wish-fulfilment. Their 'discovery' is accompanied by an intense emotional experience, which is evidently of an aesthetic nature, since it leads their discoverer to regard them as essentially 'beautiful'.

The interesting thing about the Surrealist's emotional attitude to his 'found object' is that it represents *an intermediate point between the attitude of the artist and that of the beholder*. In so far as the artist is not responsible for the existence of the object, but simply 'finds' it, he may be said to play the role of a beholder as much as any member of the general public who 'finds' such an object in a Surrealist exhibition. On the other hand, in so far as he is the person who discovers a hitherto unrealized significance in the object and 'frames' it by isolating it from its environment, he may be regarded, in a quite intelligible sense, as the creator of the object. As regards the 'found object' itself, the interesting thing is that it is just a work of art and no more. It is really *a work of art approximating quantitatively to a zero value*—a minimal work of art.

V. THE HISTORICAL ORIGIN OF ART

Considered from the point of view just indicated, the 'found object' of the Surrealist may well throw some light upon the historical origin of art. As we are reminded by Herbert Read (5), p. 13), it has been found that in many of the earliest cave-drawings the objects represented are drawn round some projection or other natural feature forming part of the cave-wall itself. Such natural features are comparable to the 'found objects' of the Surrealist. They evidently suggested to the prehistoric artist the figures (usually animals) which he felt impelled to portray. Like Surrealist objects, they were 'objects functioning symbolically' and represented a union between the outer world of reality and the inner world of

wish fulfilment; but, instead of just framing them as the Surrealist frames his 'found objects', the prehistoric artist went a step further and made them the nucleus of a picture in the accepted sense. Considered from the quantitative point of view, the resulting work of art thus represented a considerably greater departure from a zero value than does the 'found object' of the Surrealist; and it was only a further departure from this zero value, when the prehistoric artist created a picture which required no natural object as its material nucleus.

VI. THE GENESIS OF THE WORK OF ART

(a) *The discovery of the object*

The relationship between the 'found object' and the work of art in the accepted sense may be illustrated with reference to a picture entitled "Visage Paranoïaque" by the Surrealist artist Dali (6), Plate 30). Hung in the horizontal position, this picture is seen to represent a group of natives sitting before an African building covered with foliage in a desert setting; but, if the picture is rotated clockwise through 90°, the building with the natives sitting before it assumes the appearance of a human head. In the absence of knowledge regarding the circumstances which led to its composition, this picture appears little more than a practical joke played upon the public by the artist. It appears in a different light, however, when the following circumstances are taken into account. At a time when Dali was specially preoccupied with a certain period of Picasso's painting, he was sitting at his desk one day preparing to formulate his reflexions in writing; and, while looking through his papers for some notes, he came across a picture post-card, which had been sent to him some time previously. As his eye fell upon the post-card, he immediately interpreted it as representing a picture of a head by Picasso; and it was only later that he recognized it to be a photograph of an African village with natives sitting outside their huts (see Gascoygne⁽³⁾, pp. 101 ff.). In the light of his original interpretation, however, the post-card had all the significance of a 'found object'; and this 'found object' provided the nucleus of the picture.

(b) *Wish fulfilment*

As a matter of fact, what really inspired Dali to paint the picture, to which reference has just been made, was the discovery of the process of discovery itself; and it is thus integral to the picture that the relationship

of the 'found object' to the resulting work of art should be unusually obvious.¹

This fact, together with the history of the composition, provides us with an exceptional opportunity to study the genesis of a work of art. The artist is confronted in the course of his daily experience with an object in which he discovers a symbolic significance. This significance is not inherent, however, in the real nature of the object. It is due entirely to the fact that the object happens to possess features which enable it to represent for the artist a fulfilment of his emotional needs—a 'wish fulfilment'. For the artist concerned, the discovery of such a significance in an object is tantamount to the discovery of a new object. The object thus acquires the quality of a 'found object'; and the artist seeks to preserve and perpetuate what he has found in the form of a work of art. At the same time, the 'found object' is not simply something that was there all along and is now revealed; for, since its significance is dependent upon its capacity to represent a wish fulfilment, it does not exist apart from the act of discovery. It is created by the discovery itself; and the discovery represents a creative act on the part of the artist. It is but a further elaboration of this creative act when the artist embodies his discovery in a formal work of art.

The process described may be taken to represent what happens in all artistic creation, Surrealist or otherwise. If the universality of the process is not obvious at first sight, this is perhaps chiefly due to the fact that it is not always easy to isolate the 'found object'. There need be no real difficulty, however, unless we interpret the 'found object' in an unduly restricted sense. The 'found object' may be anything in the external world, which serves the purpose of wish fulfilment for the artist. In the case of representational art, the 'found object' is the object depicted—not, of course, the object as it exists in outer reality, but the object in its emotional significance for the artist. In the case of expressionist art (and Surrealism, it may be noted, is really a development of expressionist art), the 'found object' may be derived from the combination of a number of objects, which are quite unrelated in outer reality, but which have an emotional relationship in the artist's mind. The same applies even in the case of abstract art; for, even when art is at its most abstract and is concerned solely with the arrangement of lines, planes, surfaces and colours, the composition represents a combination of emotionally related elements derived from the artist's experience of the external world.

¹ It is a common practice of Dali to portray in his pictures the processes underlying artistic creation, and in particular the process of symbolization.

(c) *The need for disguise*

In the light of my previous paper, we must, of course, regard the emotional needs, which determine the significance of the 'found object' for the artist, as predominantly unconscious. It is true that the Surrealist appears to be conscious to an unusual degree of the nature of the appeal made to him by his 'found objects'; but the case of the Surrealist is exceptional in this respect, that it is his conscious aim to effect a union between the world of reality and the world of the unconscious. As I pointed out in my previous paper, the comparative poverty of the art work in Surrealist works of art is evidence of a relative failure of repression. Consequently, it is only to be expected that in the case of Surrealist art the 'found object' should represent the demands of unconscious urges with an unusual poverty of disguise. In the case of most schools of art, however, the incidence of the 'found object' is determined by a greater need for disguise; and, consequently, it is usual for the ultimate significance of the 'found object' to be unconscious, although, of course, the fact of the object's appeal is consciously recognized. Even for the Surrealist, indeed, a certain amount of disguise appears to be necessary to enable any object to function as a 'found object'. At least this seems to be the meaning of André Breton, the leading exponent of Surrealism, when he says, "One's pleasure is always partly accounted for by the lack of resemblance between the desired object and the *discovery*" (4), p. 42).

VII. THE NATURE OF AESTHETIC EXPERIENCE

Taking as our starting-point the attitude of the Surrealist to his 'found objects', we have now considered the discoverer of the 'found object' in the role of *artist*; and the conclusion which we have reached is that all artistic creation involves the discovery and perpetuation of a symbolically significant object, i.e. an object which symbolizes for the artist the fulfilment of unconscious emotional needs. If now we consider the discoverer of the 'found object', no longer as artist, but simply as *beholder*, we seem justified in concluding that aesthetic experience represents a specific emotional reaction, which occurs when a symbolically significant object is discovered in the external world.

Aesthetic experience may accordingly be defined as *the experience which occurs in the beholder when he discovers an object which functions for him symbolically as a means of satisfying his unconscious emotional needs*. Although, of course, the fundamental emotional needs of mankind are

shared by all, nevertheless in the case of any given individual they are influenced by a considerable number of factors; and, in consequence, individuals vary both in the precise nature of their emotional needs and in the amount of disguise necessary to enable an object to function symbolically for them, i.e. to function as a 'found object' and not as an actual object. This fact enables us to appreciate the subjective character of the aesthetic judgement.

VIII. THE WORLD OF ART AS A WORLD OF 'FOUND OBJECTS'

The aesthetic character of the experience, which occurs in the beholder in the presence of a 'found object', remains unaffected, whether the 'found object' belongs to the world of nature or belongs to the world of art. The world of art differs, however, from the world of nature in that it is composed specifically of 'found objects', whereas in the world of nature the 'found object' is only incidental. It does not follow, of course, that every work of art will appear beautiful to everyone. Indeed, we have already seen that the contrary is the case. Nevertheless, we must assume that every work of art must appear beautiful at some time to someone—if only to the artist who creates it.

If the world of art represents a world of 'found objects', the artist is evidently a person who is specially good at discovering such objects. A capacity of this nature is by no means the sole qualification of the artist, however; for, in the mere discovery of a symbolically significant object, the artist is as yet little more than a beholder, although he may have the capacity for discovery—the gift of 'vision'—in an unusual degree. The beholder only becomes an artist when he isolates or frames the significant object and gives it a certain permanence by, so to speak, converting it into a monument. The task of so doing constitutes artistic creation.

The most primitive form of artistic creation is represented by the 'found objects' of the Surrealist. In this case the 'found object' is merely framed more or less as it is found. A slightly more complex product of artistic creation is represented by such 'surrealist objects' as are constructed out of a variety of actual objects. It is but a further step along the path of artistic creation when symbolically significant objects come to be represented in pictures and sculptures. Once this stage is reached, the range of 'found objects' which can be so represented becomes, of course, enormously enlarged. The whole gamut of natural phenomena is placed at the disposal of the artist; and the possibilities

of artistic creation are thus made more commensurate with the range of the artist's vision.¹

The role of the beholder of a work of art is to discover for himself the objects which the artist has already discovered and isolated for him; and it is for this reason that the element of *surprise* is integral to the aesthetic experience. It is to this element that Herbert Read refers in *The Meaning of Art*, when, speaking of the frame of mind in which the beholder ought to approach a picture, he says "All that is necessary is that he should have a perfectly *open* mind.... He just walks round a corner, thinking of nothing in particular, and comes to a standstill before this object.... Many theories have been invented to explain the workings of the mind in such a situation, but most of them err, in my opinion, by overlooking the instantaneity of the event" (7, pp. 17 and 18). The importance of the 'open mind', to which Herbert Read refers, resides, of course, in the fact that the open mind is a precondition of discovery; and the 'instantaneity of the event' is characteristic of the act of discovery itself. In walking round a corner and finding himself confronted with a work of art, the beholder is thus placed in a position to 'discover' a symbolically significant object. It is true that the object is already a 'found object' in that it represents what its creator (the artist) has already discovered. Nevertheless, it is a new discovery for the beholder. In making his discovery, the beholder shares the experience of the artist who made the discovery in the first instance; and, by identifying himself with that artist, he shares the satisfactions of artistic creation himself.

IX. THE FAILURE OF AESTHETIC EXPERIENCE

(a) *Over-symbolization and under-symbolization*

It is always possible, of course, for the beholder of a work of art to fail to identify himself with the artist who created it. When this happens, as it frequently does, the work of art fails to present itself to the beholder as a 'found object' and no discovery takes place. Such a phenomenon may be simply due to a lack of technique on the part of the artist—as when, for example, a painter lacks sufficient mastery over his material

¹ It seems permissible to speculate that the psychological processes, which led primitive man to immortalize 'found objects' in the form of works of art, may also have led him to immortalize such objects in the form of specific sounds, and that it is to this fact that we must look for an explanation of the origin of *language*. If this speculation is correct, then language must be regarded, not only as providing a medium for literary art, but as having originally constituted a form of art in itself. Indeed, in much of what is known as "Modern Verse" language would appear to have reverted to just such a status.

to know how to produce the effects which he desires. It may occur, nevertheless, even when the technique is good. In this connexion I am reminded of a visit which I paid to the Royal Academy of 1936. As I went round the gallery, it so happened that I kept step with a clergyman; and I noticed that, each time he came to a picture by Stanley Spencer, he turned to his companion and expressed an unfavourable verdict in unmeasured terms. His final outburst was to this effect: "Did you ever see anything so dreadful? This isn't really art at all. And the worst of it is that the man can paint!" Obviously Stanley Spencer's pictures did not present themselves to this particular beholder as 'found objects'—and this in spite of the fact that he could not help recognizing the artist's mastery of technique.

When such a situation arises, the reason why the work of art does not appear in the light of a 'found object' is that there is a disparity between the total emotional needs of the artist and those of the beholder—'total emotional needs' because it is a question, not only of the expression of repressed urges, but also of the demands of the super-ego and of that need for 'restitution', to which reference was made in my previous paper. This being so, the failure of a work of art to appeal to the beholder as a 'found object' may be due to either of two causes:

(1) It may be that the censorship of the artist's super-ego is so rigorous, and necessitates such an elaborate disguise of the urges expressed, that the work of art is deprived of almost all symbolic significance for the beholder. In such a case the work of art makes no emotional appeal. It falls flat. It conveys the impression of sterility. It provokes the criticism that the artist 'has nothing to say'. The beholder looks at it and makes no 'discovery'. Such is the impression created upon the artistically educated of the present generation by such Victorian works of art as the pictures of Lord Leighton.

(2) The inability of a work of art to present itself as a 'found object' may occur for a totally opposite reason. So far from being due to excessive censorship on the part of the artist's super-ego, it may be due to a relative failure of such censorship. When the artist's super-ego is weak and his repressed urges are really 'urgent', these urgent urges express themselves in the work of art with a minimum of disguise. The effect of such a work of art is to provoke an excessive emotional reaction in any beholder whose super-ego is more exacting than that of the artist, and whose need for the disguise of repressed urges is greater. So far from saying too little, such a work of art says too much. It says more than the beholder's super-ego will tolerate. Consequently, under the pressure of

impending anxiety, the beholder rejects it with feelings of disgust or indignation. In the presence of such a rejection, of course, the work of art cannot present itself as a 'found object'. The experience of 'discovery' is precluded because the object represented actually fails to convey the impression of symbolic significance to the beholder; and the reason of this failure is that the object is not sufficiently symbolic to pass the censorship of the super-ego. It is, so to speak, too like the real thing. This applies, so far as most people are concerned, to Surrealist works of art in general.

(b) *Form without content, and content without form*

It is to be noted that, in both cases instanced, the reason why the work of art fails to present itself as a 'found object' is that it lacks symbolic significance for the beholder concerned. The reason for this differs, however, in the two cases. The work of art lacks symbolic significance in the former case owing to an *over-elaboration* of disguise, which precludes any appeal to the repressed urges, in the latter case owing to an *inadequacy* of disguise, which leaves the requirements of the super-ego unsatisfied. It lacks symbolic significance in the one case because it is so over-symbolized that its symbolic reference becomes completely obscured, and in the other case because it is so under-symbolized that it has not reached the stage of being symbolic at all. To express the same thing in other terms, we may say that in the former case the symbolism has form without content, and in the latter case it has content without form. It is only in such a reference, at any rate, that any useful meaning can be attached to the contrasted terms of 'form' and 'content', which have long been a source of confusion in aesthetics.

(c) *The optimum of symbolic significance*

At this point an observation of considerable significance may be recorded. Whilst there is a marked difference in the emotional reactions produced in the observer by the over-symbolized and the under-symbolized works of art respectively, yet both tend to provoke a common criticism. Both are equally liable to call forth the comment, "This isn't really art at all". This fact is important because it indicates that, for any given beholder, the work of art depends for aesthetic value upon the degree to which it approximates to an *optimum of symbolic significance* lying at an intermediate point on a scale between over-symbolization and under-symbolization. In other words, a work of art only acquires an

optimum of aesthetic value for the beholder in so far as it enables both his repressed urges and the demands of his super-ego to obtain a maximum of satisfaction.

X. THE PRINCIPLE OF RESTITUTION

(a) *The work of art as a 'restored object'*

The duality of satisfaction which we have just found to underlie aesthetic experience is now seen to correspond to the duality of satisfaction provided by artistic activity; for, as was pointed out in my previous paper, artistic activity performs the double function of providing a means of expression for the repressed urges of the artist and of simultaneously enabling his ego to pay a tribute to the supremacy of his super-ego. It was also pointed out in my previous paper that, in so far as the work of art consists in a tribute paid by the artist's ego to his super-ego, it essentially represents a means of restitution, whereby his ego makes atonement to his super-ego for the destruction implied in the presence of repressed destructive impulses. In pursuance of the analogy between the emotional needs of the beholder and those of the artist, we may now infer that the aesthetic appeal of a work of art will depend upon its capacity to represent a restitution for the beholder also. The aesthetic experience is thus seen to be an experience that occurs when a person finds himself confronted with an object which presents itself to him, not simply as a 'found object', but also as a *restored object*.

Now that a work of art is seen to depend for aesthetic value upon its capacity to function as a 'restored object' for the beholder, we can understand better how it comes about that aesthetic experience should be compromised in the presence of both under-symbolization and over-symbolization. The under-symbolized work of art fails to produce the effect of restitution, because the impression which it gives is one of more or less unmitigated destruction and, consequently, the demands of the super-ego remain unsatisfied. On the other hand, restitution is meaningless apart from the presupposition of destruction; and, consequently, over-symbolization precludes the effect of restitution by excluding the impression of destruction too rigorously.

(b) *The optimal synthesis*

Here we are at once reminded of the central conception of Hegelian philosophy—a conception summarized by Edward Caird in the statement that "the highest unity is to be reached only through the full development

and reconciliation of the deepest and widest antagonism" (8), p. 42). Taking advantage of this philosophic conception for descriptive purposes, we may say that aesthetic experience depends upon the resolution of an antinomy created by the simultaneous operation of the libido (the life principle) and the destructive urges (the death principle). In the resolution of this antinomy the demands of the libido may be said to constitute the thesis, the pressure of the destructive urges the antithesis, and restitution the synthesis. What conditions aesthetic experience within the field of art is the capacity of the work of art to represent such a synthesis for the beholder. For a complete synthesis to occur, there must be an optimum proportion in the relationship between thesis and antithesis. It is only in so far as such an optimum relationship exists that the work of art becomes a 'restored object'. In a work of art characterized either by under-symbolization or by over-symbolization the proper relationship is absent, and the aesthetic experience is accordingly compromised.

XI. AESTHETIC THEORY

It is to the dependence of aesthetic experience upon the satisfaction of a need for restitution in the beholder that we must look for the rationale of that type of aesthetic theory which seeks the clue to 'beauty' in a certain 'perfection' or completeness in the object. This type of theory has, of course, played an enormous part in the history of aesthetics. It is true that it has had fewer advocates in recent years, as psychologists, anthropologists, art critics and even artists themselves have increasingly invaded the field of aesthetics, formerly so largely monopolized by philosophers. Nevertheless it has always made a special appeal to the more philosophically minded; and it has undoubtedly dominated the field of aesthetic theory in the past. Its most concise formulation is perhaps that of Aristotle: "The essential characters composing beauty are order, symmetry and definiteness" (9). Such a formulation is representative of a widespread tendency in aesthetics to regard the 'beauty' of a work of art as residing in its capacity to convey the impression of something *intact, whole, complete* or *perfect*; and the presence of this tendency may be regarded as confirming the correctness of the view that aesthetic experience depends upon the satisfaction of a need for restitution in the beholder.

In the history of aesthetics there is evidence, however, of a contrasting line of thought—a line of thought perhaps best epitomized in Croce's

claim that "expression and beauty are not two ideas but one" (10). Expressionist theories of aesthetics seem to make a special appeal to the modern mind, characterized as it is by a tendency to question time-honoured values. That they are no novelty, however, may be illustrated by reference to Aristotle himself; for, in spite of his 'perfectionist' theory of aesthetics in general, we find Aristotle ascribing the appeal of tragedy to its capacity to effect a catharsis of the emotions of pity and fear—an essentially expressionist interpretation (11). Considered in isolation, such a theory is hopelessly inadequate to explain the aesthetic value of tragedy, since the emotions of pity and fear in themselves tend to compromise aesthetic values rather than to enhance them—the reason being, of course, that pity and fear imply a sense of uncontrollable destruction at work. The tragedy which simply releases pity and fear is thus comparable to the under-symbolized picture. Its effect is to produce a state of distress or horror in the beholder, and to provoke a reaction of rejection on his part. On the other hand, a tragedy which fails to release pity and fear in the beholder is rejected as emotionally unconvincing. It appears trite or ludicrous, because it fails to convey any impression of destruction at all, thus excluding the possibility of restitution. Such a tragedy is comparable to the over-symbolized picture.

It becomes evident, therefore, that it is only when a tragedy complies with perfectionist as well as expressionist standards that it acquires aesthetic value. To impress the beholder as in any sense 'beautiful', a tragedy must not only release the emotions of pity and fear, but at the same time produce an impression of completeness and perfection—an impression of '*the integrity of the object*'. The fact is that the expressionist and perfectionist theories of aesthetics each represent a half-truth—the whole truth being that a work of art can only appear 'beautiful' to the beholder in proportion as it satisfies the particular conditions demanded by his need for restitution. To satisfy these conditions (i.e. to appear beautiful), the work of art must be able above all to produce in the beholder an impression of the 'integrity of the object'; but, in order to do so, it must at the same time provide a release for the emotions which imply the destruction of the object. Otherwise the conditions of restitution remain unsatisfied; and aesthetic experience is accordingly precluded.

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PROPOSED EXPLANATION OF INDIVIDUAL DIFFERENCES OF ABILITY BY "SAMPLING"

BY C. SPEARMAN

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I. A LONG CONTROVERSY

FOR several years, the theory of ability known as that of "Two Factors" has been energetically opposed by that of "Sampling". In 1931 the present writer found himself obliged to consider this doctrine much more systematically than before. But the result was still adverse⁽¹⁾. Later on, however, notably by Thomson in 1935, the sampling theory was emphatically reaffirmed⁽²⁾.

The following article aims at making the issues clearer. One special motive for so doing is that the time seems to have now arrived, if not indeed for eliminating all the doctrinal discord, at least for rendering its scope much narrower.

Another reason for my present intervention is that Thomson, although very kind and ample in his general allusions to myself, appears to have overlooked just my aforesaid writing, which explicitly and systematically dealt with the subject. Not only does this work find no place in his references, but also the points raised by it get from him little or no reply.

II. ALLEGED HIERARCHICAL "TENDENCIES"

For the purposes of clarification, let me first of all try to define better certain current expressions which have been peculiarly misleading. Our whole Two-Factor doctrine has been based on the theorem that—under

certain statable conditions—the intercorrelations of any set of ability-scores tend to a regular arrangement. This is designated as hierarchical and is proved by the fact of certain quantities, called tetrad differences, being equal to zero. But against this position, Thomson and his followers urge that a mere “tendency” to zero tetrad differences arises necessarily from, and therefore is more properly explained by, the bare action of Random Sampling.

His and our usages of the word tendency, however, lie very far asunder. In the language of the proponents of Sampling, the tetrad differences are said to “tend” to zero when such is their average value (or their most probable one).¹ But *this* zero automatically ensues from the bare fact of the tetrad differences in question being symmetrically distributed with *opposite signs*. It is really devoid of significance for the Two-Factor theory, or indeed for that of Sampling.

In the language of the Factorists, quite otherwise, the tetrad differences said to tend to be zero are those which are taken *without regard to signs*, or absolutely. And what the Factorists have here meant by “tendency” is that the values are not indeed perfectly zero as actually observed, but become so when all allowances have been made which are definitely prescribed by the theory (as, for instance, the proper compensations for probable errors, or those for duly verified group factors). Any zero or hierarchy still more perfect than this would not improve the evidence for the theory, but only mar it.

As evidence for such a theoretical tendency of the absolute values to perfect zero, we may quote especially the researches of Stephenson and those of Brown. The former author, using 1000 subjects, found the observed median deviation from zero to be no more than 0.008, which could be accounted for exactly by the error of sampling, since the probable value of this was practically the same, namely 0.009 (4).

More detailed still was the statistical agreement of observation with theory reached next year by Brown (5, 6).

III. ALLEGED BIAS OF SELECTION

We pass on to another and even graver trouble. The Samplists have charged the Factorists with biased procedure. We are depicted as “selecting” or “picking” those tests and correlations which are favourable to the hierarchy and “ignoring” or “trimming” the remainder (see (2)). In truth, however, far from favouring the cases that conform to the

¹ See, for example, Thomson ((3), pp. 69–70); also repeatedly (2).

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hierarchy, we have been just as much concerned to discover the cases that fail to conform. In fact, our studies have been mainly devoted to determine the position of the *border line*.

On certain minor points, no doubt, our theoretical anticipations have sometimes encountered disappointment. But very soon these seeming departures from the theory have turned out to be really extensions of it. Thus on one occasion they could be explained by, and so led to the discovery of, a further spatial factor, which has since been abundantly verified (7). In much the same way, long before, a seeming discrepancy of the experimental results of Hargreaves had led him to the detection of the subsequently corroborated factor of "fluency" (8). Such discoveries are analogous to that which brought astronomers, from observing disturbances in the motion of Uranus, to disclosing the existence of Neptune. Another physical instance was when an observed excess of weight in a chemical analysis guided to the detection of a new element (lithia). All such cases exemplify Mills' familiar scientific method of "residues".

IV. MAIN "TWO-FACTOR" THEORY

Let us now turn to where the Samplists and the Factorists do admittedly come into line. This surely is a point deserving more general and consistent recognition. Thomson himself writes generously enough:

I have never denied the possibility of Professor Spearman's Theory of Factors, as some seem to think. . . . I think that his system is an admirable *description* of correlation data (see (2), p. 64).

But he goes on to add that this system does not give *causes*. The factors, he declares, are no "entities" or "organs"; they have no "realexistence", any more than has a mere average, or a standard deviation. And if, as is the impression conveyed, he implies that such causes form an integral part of our theory of Two Factors, he is gravely misrepresenting us. A "factor" with us has only its ordinary meaning as given in the dictionary. If meaningful (as opposed to merely statistical) it is taken to be: "one of the circumstances, facts or influences which produce a result".

In this reference we Factorists may fairly complain that the opponents of our view persistently overlook what has always been one of its most fundamental features. This consists in the distinction made by us between what we have called respectively our "main" theory and the supplementary "sub-theories" (9).

The theory includes a number of theorems. The chief of these may be formulated as follows. Every ability score can be divided into two parts

called respectively "general" and "specific". These two are uncorrelated. Different specific abilities, on the other hand, are uncorrelated with each other when, and only when, their mutual likeness (or other tie) sinks below a certain critical point. With any greater likeness, these abilities do become correlated. And the production of correlation in such a way is responsible for the so-called "group factors". The primary development of this theory consists in proving the existence of these critical points and determining their positions. But secondarily, many further single theorems are introduced for the purpose of building up a complete theory of greatest attainable service. Most of them are collected in the Appendix to my *Abilities of Man*. All alike deal only with factors as quantitative influences, *not* as "organs". And so far, the Factorist and the Samplist views would appear to be, after all, in general agreement.

Whilst on this subject, however, a few words may be said on some other points that seem to have been embarrassing. One is a distinction that has been stressed between the "theory" and the "method" of Two Factors. Really, both words are used by us in their natural senses: "theory" means a general way of looking at things: "method" is a procedure for attaining to any object. Both depend on the same set of separate Two-Factor theorems.

But why "two" factors and not rather one, or three, it has been repeatedly protested? To this we would reply that in our view we can divide up an ability into as many factors as we please, all of them equally true. But some divisions will have much greater general importance than others. And the division which is most important of all, it seems to us, is into two parts, the general factor and the specific factor. Next in interest comes the subdivision of the specific factor into correct value and mere random error. But, as said, to the possibility of such divisions there is no finite limit.

So much for the main theory of Two Factors. Elsewhere, I have given chapter and verse to show that there has been no essential change in it from its first enunciation in 1904. And it might be fairer if those opponents who state or imply that I have ever made any radical alterations would try to substantiate this charge from my own words; not, as Thomson and others appear to do, only by passing it on from one to another (10).

V. SUB-THEORIES: ENERGY VERSUS SAMPLING

Supplementary to all this, our rather confidently advocated main theory which envisages mere quantities, have come the more or less

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speculatively advanced sub-theories, by which such quantities may be interpreted and *explained*.

Even as regards these sub-theories, however, Thomson and I really go a long way hand in hand. In his most emphatic expression of his doctrine he has written as follows:

My own view is that the mind is one extremely complex organism which, at the time when it comes to attempt any of the tests used in the production of these tables of correlations, draws its ability to succeed in any one of them from a multitude of sources, some inherited genes for this or for that, some points of training or of experience during education and during life.

And on these words I proceeded to make the following comment:

In itself this view is irreproachable. Indeed this or something like it has long been agreed upon by everybody. The real problem is not as to whether some such situation of multiple elements exists or not, but as to how it can best be harmonized with another known situation (the correlational hierarchy)... One attempt—hypothetical indeed, but fitting admirably with an immense number of known facts and contradicted by none of these—is to regard the genes as dominantly responsible for producing a general factor of power, whereas the “points of training or of experience” are taken to be the main contributors to the specific factor (1), p. 158).

Accordingly, he and I alike conceive the correlations to derive *ultimately* from “a multitude of sources”. We only disagree as to the manner that we respectively think of the derivation as occurring.

For my part, I get most help from supposing that the multitudinous particular small causes act by way of all contributing to one and the same general “power”, “energy”, “potential”, or, in particular, Lashley’s “mass action”.

Thomson, on the other side, thinks he can get from the original multitude of small causes to the observed hierarchy by merely taking “samples” of the former and “leaving the rest to chance”. This, he said, “will give hierarchical arrangement in the overwhelming majority of cases”: “hierarchical order will arise unless we take pains to suppress it” (11), p. 341).

VI. VERSIONS OF “SAMPLING” REPUDIATED BY THE SAMPLISTS

However, this notion of Sampling has proved unexpectedly troublesome. Already in 1914 I had myself brought forward what seemed to me the two most natural forms of it and had shown that they could *not* produce, or even conform with, the observed hierarchical arrangement.¹ But Thomson

¹ See especially (12); of cardinal importance here are various works of J. C. M. Garnett.

summarily disposed of this earlier work by remarking that we had taken "an entirely different meaning of the word Sampling" (2), p. 66).

Undaunted, Brown and Stephenson tried to improve matters by accepting the version of Sampling used in the admirable research of Blackie, who was a student of Thomson and had worked in consultation with him. But the result was again that the Sampling theory broke down (13, 14). And once more Thomson disposes of the matter by saying that "the adoption of these equations (of Blackie) means giving up entirely what I had meant by Sampling" (2), pp. 66, 70).

Altogether, Thomson seems to have moved very far from his original attempt to explain the hierarchy by *any* chance or random arrangement of elements. The hierarchy now appears to be only explicable by a sampling of some distinctive kind not easy to apprehend.

Small wonder, then, if Brown wrote resignedly that the comparison of the two theories at issue:

...is handicapped by the inadequacy of the formulae hitherto brought forward in connection with the Sampling Theory (15), p. 398).

VII. VERSION NOW ADVOCATED

With the further aid of his present exposition, however, let us make yet another attempt to capture this elusive notion of "Sampling". Originally, Thomson wrote as follows:

Let us suppose that the mind, in carrying out any activity such as a mental test, has two levels at which it can operate. The elements of activity at the lower level are entirely specific: but those at the higher level are such that they may come in play in more than one kind of activity, in more than one mental test. . . (11).

Next year he seems to have dropped the two levels, but otherwise to maintain as strongly as ever that

Hierarchical order is the natural order to be found among any set of correlation coefficients, *however the correlations may be caused*, provided only that the bonds which cause the correlations are left, as we say, to chance: that is, provided the phenomenon is of that complex nature which, in default of analysis, we call *random* (16).

More definitely he wrote seven years later:

Let there be a universe of A elements, all-or-none in nature, and quantitatively equal in their effects, of which universe a_1, a_2, a_3 , and a_4 , are samples of those numbers respectively of such elements. To clarify ideas (though the illustration will limit and coarsen the possibilities), A may be thought of as the totality of neurones in the cortex, a_1 the neurones concerned in the first activity, and so on (3).

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Finally, eight years later still, he takes each variate (test-score) to be:

The straight unweighted sum of its components or elements, which were a sample taken from the pool of all such elements (2).

This doctrine he now expresses in the following equation, one however which is not informative, since it is common to all theories on the subject. It is, as it were, but the canvas on which has still to be painted the picture itself:

$$z_i = m_{i1}e_{z1} + m_{i2}e_{z2} + \dots + m_{iN}e_{zN},$$

where z_i is the score of the individual z at the test i , the e 's are the factors entering into this score and the m 's are their respective coefficients, weights, or loadings. Turning to the qualifications of this equation, which do distinguish and characterize the theory of Thomson, these seem to include especially the following assumptions. If they are not really his, we should be very glad to have from him a revision of them.

Assumptions of Sampling Theory

(1) The Universe of N elements is extremely large. This hypothesis is implied in the suggestion that the e 's may represent a person's neurones.

(2) The N m 's are restricted to the values one or zero.

(3) The n m 's entering into any test constitute a "sample" of all the m 's.

(4) The n e 's of any individual in the test constitute a "sample" of all his e 's.

(5) Each test has its own arbitrarily defined "richness"; that is to say, the proportion of m 's which are not zero.

VIII. OBJECTIONS

Now, to these fundamental assumptions of the sampling theory, there would appear to be the following objections:

(a) A sample, whatever else it may mean, consists certainly of a number of units drawn from the chosen universe independently of one another. And statisticians know that such a sample is extremely difficult to find in any field. Least of all seems such an independence to be reasonably expected between the elements entering into such a highly organized thing as a mental test. One must think rather that such a sample of independent elements as is indicated in assumptions (3) and (4) could only produce nonsense.

(b) If the said assumptions did hold, then they would not merely cause—as Thomson says—a “tendency” to hierarchical arrangement. Instead, since N and therefore n (if there is to be correlation) are extremely large, the hierarchy would needs be as good as perfect. This again is in conflict with experience.

(c) The third of the preceding assumptions appears to preclude the fifth. If the m 's entering into any test were really a very large sample, then the “richness” could not possibly vary from test to test; for by the law of sampling $s_N^2 = pq/N$, approximately $=0$, where p and q are the respective chances of an m being one or zero, whilst s is the standard deviation of the proportion of the m 's that are $=1$.

(d) The preceding conditions would seem to produce many further results incompatible with actual observations. For instance, by virtue of (1) and (4) an individual would have the same standardized score at every test. Again, all the correlations would be equal.

On the whole, then, Thomson's “Sampling” theory of abilities, in its present state of development, seems to be definitely unacceptable. As may be seen, the chief troubles arise from the hypothesis that N is large. But if, instead, it be made small, then other no less fatal difficulties supervene. The whole plausibility of the sampling theory has only originated from equivocating between the one hypothesis and the other (1).

Nevertheless, the importance of this result should not be over-estimated. After all, we have only been dealing with very speculative hypotheses, about whose truth or untruth there appears to be in any case no finality. Each is only cherished for as long as it continues to be scientifically helpful.

IX. PSYCHOLOGICAL SERVICE

But here we come upon a more serious danger. How far do, in fact, the two rival hypotheses fulfil their essential mission of stimulating scientific progress?

Consider first, the theory of Two Factors, beginning with the general factor “ G ”. Surely, we have been fruitfully led to make numerous inquiries about its nature and function. Does the influence of this factor increase in proportion as the ability at issue is “noegenetic”? At what age does it mature? To what extent is it acquired by experience? Or take any specific factor “ S ”; say, the “verbal” one. We have been brought to ask what mental processes this factor involves.

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We are urged to enquire how far it enters into children's difficulties in learning to read. Again, in what fashion, if at all, is it connected with pathological disturbances of speech? Answers to these and innumerable analogous questions seem to be cogently needed for all conduct of life; for education, medicine, industry, sociology, genetics, and so on without limit.

Now in respect of these momentous problems, the Factorists claim to have achieved steadily progressive information year by year, as befits genuine science.

But where, on the other hand, does the work of Thomson and his followers come into the picture? For my own part, with all good will, I cannot answer this question satisfactorily. All the other though conflicting schools of research—as those of Kelley, Thurstone, Holzinger, Brown and Stephenson—would appear at least to be helpfully checking and counter-checking one another, so as gradually to build up one great agreed edifice. Whereas Thomson's elaborate excursions instigated by the theory of sampling—in themselves generally most ingenious, and even irreproachably correct—would appear to have little or no contact with any of the vital matters of psychological significance.

X. CONCLUSION

Altogether, our examination of the "Sampling" theory of ability has led to an unfavourable issue. According to our considerations, it would seem to have been obscure in expression; to contradict admitted facts; to tempt its proponents into misrepresenting the rival Two-Factor theory; and, worst of all, to divert their own work from contact with actual mental experience, and therefore from benefit to psychological science.

Still, this Sampling theory is after all only hypothetical. In consequence, it can readily be discarded without in any way disturbing the actual facts, either mathematical or observational. And on such release from it, the doctrine urged by the Samplists turns out to be no other than that which has always constituted the "main" theory of the Factorists themselves. In this fashion, the way appears wide open to reconciliation and collaboration.

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PUBLICATIONS RECENTLY RECEIVED

Driver Testing Results. By HARRY R. DE SILVA and THEODORE W. FORBES. Harvard Traffic Bureau. 1937. Pp. vi+98.

This rather slipshod report presents the results of testing 1776 motor-car drivers drawn from five American cities. The battery of tests used comprised a Standard Vigilance Test (designed to test speed of reaction, manipulative ability and 'Vigilance'), a Speed Estimation Test, a Glare Test, a Miniature Highway Driving Test (designed to test simultaneously complex judgments of speed and timing, and accuracy of manipulation of car controls), a test of Peripheral Vision, an Auditory Test, a test for Colour Vision and a test of Visual Acuity. In addition each subject was asked to answer a questionnaire on personal characteristics, including questions on length of driving experience, customary road speed, number of years of academic education, parentage, civil status, pigmentation, etc.

The drivers tested were divided into 'Volunteer or Average Drivers' (male and female) and 'Accident Repeaters'. No definition of these two categories is given and it is not at all clear on what basis they were selected. For instance, in a section on illustrative cases of drivers who have had accidents, it is said that "many of the drivers have only one or two accidents on their record, whereas they might easily have others and perhaps will have others in the future", whilst two pages later it says, apropos of local differences in test scores, "This interpretation assumes that the volunteer group is a fair average sample in each case." One wonders if the first set of drivers with only one or two accidents on their records in three years were called 'Repeaters' and whether steps were taken to obtain and examine accident records for the 'Volunteer' group. The comparisons between the test scores of these two groups would have gained much more weight if evidence had been given to show that the 'Average' groups of drivers really could be used as controls to the 'Repeater' groups.

Assuming, however, that the comparison between the two groups is legitimate, one reads that the accident repeaters show "a consistent and rather general deficit in the abilities represented in the test battery". On examination of the statistical tables at the end of the report it is apparent that the consistency is not very marked, as the differences between test means are given as statistically significant in two out of four cities, one city showing insignificant results in every case. Of this city the authors state: "Table 4 (City E) is at variance with the other three, probably due to lack of development of the tests and less training of the examiner at the time of testing." This may be so, but no such reason is advanced in the case of City C, where only four out of eleven comparisons can be regarded as significant on the basis of these tables. However, it appears on the whole that the accident repeaters are poorer in certain of the tests than are the 'average' drivers, a result which agrees with work done by other investigators in other countries.

Numerous other comparisons of greater or lesser importance are made. Stated briefly, the authors find that the abilities tested by certain of the tests decrease with age, the tendency beginning to be most evident at between thirty and thirty-five years of age: that in general, commercial drivers were somewhat above average at the tests: that in general, women drivers are poorer than men in tests involving muscular quickness and accuracy. Little of definite value seemed to emerge from an examination of outstanding personal characteristics.

Certain significant differences between the test performances of 'volunteer' drivers drawn from different cities were found, and the authors state that "differences obtained are interpreted to mean that certain factors such as congestion and the

type of street layout and other driving conditions in certain areas call for different degrees of skill for successful driving in certain cities". This interpretation is exceedingly doubtful since it assumes an almost complete identity between driving ability and the test used, and although the authors show fairly convincingly that there is a relation between the tests and accident incidence, it cannot be assumed without evidence that there is a perfect association between driving ability and accidents sustained. The authors throughout seem to assume that a driver who has not sustained any accidents in the particular period of observation chosen is *ipso facto* a good driver and that a driver who has had an accident is a bad one. This is, of course, allowable as a definition, but without a qualitative examination of the individual accidents it is hardly warrantable to assume an identity between driving ability and number of accidents. In any case it seems unlikely that the psychological qualities tested should really differ from city to city on account of differences in traffic conditions.

A most important statement is made on page 49 of the report. Under the heading 'Re-education Value', the authors make the following statements. "The largest group tested consisted of 470 male accident repeaters. This group was made the subject of a follow-up study on accident records and proved to have a 90% reduction in accidents during the following six months, as compared to a similar group of accident repeaters who were given no tests or education. This, therefore, constitutes evidence that the tests have very definite and specific value in the re-education of accident repeaters and poor drivers." One searches throughout the report in vain for the evidence on which this important point is based. Obviously, if it is true, the possibility of re-educating accident-prone drivers is extremely important as a practical method of reducing accident incidence and one would have liked to have seen the evidence for the striking example of its efficiency which is given. All that is apparent, however, is that the group referred to is City E, and the authors elsewhere throw doubts on the reliability of the tests given to this group (see above).

The report concludes with an Appendix containing thirty-seven pages of tables. Most of these present comparisons of mean test scores and are rather confusing at first sight, since the two columns headed 'Sigma M1' and 'Sigma M2' are wrongly so described: these columns appear in fact to give the squares of the standard errors. The formula used for examining the significance of the differences between means is one which is strictly applicable only when the numbers in the two groups compared are large, say at least 50. This requirement is rarely satisfied and it would have been better to have examined significances by the *t* method, which would have made the probabilities given in the last columns of the tables rather less.

The report is based on a large amount of careful work and it is unfortunate that the presentation of it is so confused and confusing. The results obtained, where sufficient evidence to judge is given, seem to be similar to those of other workers.

E. G. C.

Developmental Abnormalities of the Eye. By IDA MANN; with a foreword by SIR JOHN PARSONS. Cambridge University Press. 1937. Pp. xi+444. 50s. net.

This is an extremely detailed and thorough treatment of all deformities in which the orbit is involved and of abnormalities affecting the eye alone. It is, in the words of its author, "intended... as an example of how a pure science may be linked with an empiric one (embryology with ophthalmology) to the advantages of the latter". It is not intended for the psychologist or the physiologist, and there is very little that will be of interest to him. Some examples, however, that may be cited of abnormalities that throw light on the functioning of the eye are congenital night blindness and Oguchi's disease, in which the retina exhibits a change of colour, accompanied by slowly increasing acuity, during darkness. This is attributed to

pigment migration or to chemical changes in visual purple. Such a view is intriguing in view of the rôle suggested for pigment migration by Stiles and Crawford in accounting for some recently discovered phenomena. The sensitivity to light possessed by the muscles of the sphincter iridis is also of interest. K. J. W. C.

Les Yeux et la Vision. Par M.-L. VERRIER. Paris: Librairie Félix Alcan. 1938. Pp. 171.

This is a most interesting study of the comparative anatomy of the eye, directed to showing that the traditional dualistic concept of rods and cones is unjustifiable and misleading. According to Mlle Verrier, the visual receptors are so manifold in nature that a polymorphism must be substituted for this dualism, and she hopes that it will lead to an improved outlook in the physiology of vision.

She advances arguments from behaviour and habitat as well as from anatomy, showing that there is little evidence of discontinuity and dual function, for instance, in the variation of visual acuity with illumination. She also criticizes the arguments based on the strictly nocturnal and diurnal habits of some species, pointing out that visual receptors are often very similar in members of a class, though some may be diurnal and others nocturnal, as in the case of lizards and vipers. Further, she considers that visual organs do not appear, in general, to be particularly well adapted to the habits and requirements of their owners, and that argument from mode of life to function of organs is thus illegitimate.

Mlle Verrier has written a most valuable and interesting account of the numerous types of visual receptor which may be met with; and there is independent evidence that the classification even of the receptors in the human eye is not so simple as it seemed; e.g. Lythgoe has concluded that peripheral cones differ functionally from central ones. There is, however, considerable evidence of two main types of receptor in the human eye—those in the fovea, which are capable of little dark adaptation, and those in the periphery, which are capable of a great deal, but have little colour sensitivity; and Steinhardt has found a suggestive inflexion in the curve showing differential brightness discrimination under varying illumination. Mlle Verrier considers the night-blindness found in vitamin-A deficiency to be merely a general effect of the malaise consequent upon avitaminosis. She is impressed by the fact that the rod-free area of the retina is sensitive to white light, though surely the simultaneous stimulation of complementary colour receptors can account for this. She holds that the decrease in acuity with falling illumination is mainly due to the bad definition afforded by the lens with a wide pupil; but even the dilation of atropine does not reduce resolving power to 30 min. of arc, as may occur under very weak illuminations. But these are minor points in a book which seems to be generally accurate and affords a wealth of interesting evidence. It is doubtful, however, whether comparative anatomy can give direct proof either way, or whether this is not more likely to result from physiological or psychological experiments.

K. J. W. C.

Recent Experiments in Psychology. By L. W. CRAFTS, T. C. SCHNEIRLA, E. E. ROBINSON and R. W. GILBERT. London: McGraw-Hill Publishing Co. 1938. Pp. xiv+417. 12s. 6d. net.

All of the authors, or compilers, of this book are on the staff of the New York University. They say that their aim is "to make available to the college student and to the general reader certain investigations which are representative of the experimental treatment of twenty-eight important psychological topics". The general reader will find the volume very heavy going, and since pretty well all the reports of experiments are re-written from perfectly easily accessible journals it is not at

all easy to see why the 'college student' should not be expected to consult the originals where necessary. It is true that each experimental report is prefaced by an introduction which is said to be designed to orient the reader with respect to the topic dealt with. To many people the book will in fact seem like a bit of unnecessary spoon-feeding. The topics dealt with are extremely various, beginning with *The Origin of the Cat's Responses to Rats and Mice* and ending with *The Judgment of Vocational Aptitude and Success from Photographs*. It is not at all easy to detect any real thread of connexion from topic to topic or chapter to chapter. Nor is it easy to discern what principles, if any, led to the selection of the experimental reports presented. The great majority of the topics have, during the last few years, been made the subject of very many researches. It may be that one is meant to assume that the particular works selected are the best and are all of them of such permanent value that they ought to be enshrined in book form. That would be a very large assumption to make, even though it may be perfectly true that every research selected is good and deserves study. The fact is that current psychological research cannot really be properly represented in this manner. The general reader must have more simplified discussion and less technical detail; the student ought to go to the journals and be so instructed that he can find his own way about them.

Experimental Foundations of General Psychology. By WILLARD L. VALENTINE. New York: Farrar and Rinehart. 1938. Pp. xvii + 377. \$2.00.

Prof. Willard Valentine addresses this volume to first-year students of psychology who desire to know something about the possible factual basis of many of the general statements which they may meet. On the whole the book should serve extremely well the purpose for which it is meant. The selection of topics is perhaps a little dominated by a bias towards the professedly practical and towards the *bizarre*, but there is no doubt that a great many students who come to psychology *are* interested in these directions, and if the interests are met fairly and without prejudice they may be made a basis for something more permanent and more serious. The great bulk of the experimental work described is work done by American investigators, but the descriptions are clear and lively. Very good summaries are added, and plenty of references to easily available literature.

The Kelley Statistical Tables. By TRUMAN LEE KELLEY. New York: The Macmillan Company. 1938. Pp. 136. \$4.50.

Prof. Kelley has compiled a set of tables which should prove of considerable use to workers whose data permit of statistical analysis to a high degree of precision. The longest table gives Normal Distribution, Simple Correlation and Probability functions to eight places of decimals, and these are supplemented by cubic, quintic and septic interpolation coefficients, given to ten or eleven decimal places. The data of the laboratory or research psychologist usually do not warrant analysis to the high degree of accuracy which would justify the use of these tables, but there is much in the volume which would be very useful to anyone dealing with correlations and contingencies. The table of χ^2 functions, for example, is given in an unusual form which makes interpolation a relatively easy matter. For the full use of the tables an advanced standard of mathematical ability is required, but the ordinary research worker, guided by the explanatory matter, would find much of value to him in the analysis of his data. The book ends with tables of square roots to eight places and of constants frequently needed. Whilst these latter can be found elsewhere, of course, it is of service to have them bound with the other tables. The printing is extremely clear and well set out and the volume is of a convenient size and shape.

Race: A Study in Modern Superstition. By JACQUES BARZUN. London: Methuen and Co. Pp. x + 353. 10s. 6d. net.

This book is undeniably good. It might have been better still. The author, who writes with great force and humour and is both clear and concise, is concerned to show up the tremendous effects of centuries of 'race-thinking'. He gives most excellent accounts of a good many particular racial doctrines, of their impact on past history, and of their devastating appearance in current affairs. He has no difficulty in showing that all and any of these doctrines are riddled with error, unbalanced and insecurely based. He recognizes much more clearly than most writers that this makes little or no difference to their psychological significance and to their effects upon group policy and action. But he does not try to show seriously just how it is that the superstition of race gets so deep a hold upon popular thinking. Especially it seems a pity that he fails to consider whether there may be a sense in which very long-standing and well-organized groups acquire persistent characteristic qualities which go on from generation to generation, not in a genetic but in a psychological manner, and powerfully affect the relationships of these groups with others. If this is the case these qualities, though they are not racial, may, for example, reasonably be called 'national', and then there would be some basis other than the merely emotional one for many of the race doctrines. Still, even as it stands, the book is timely and should be widely read by psychologists and others. An appendix contains a beautiful collection of opinions called 'Race-thinking: a brief anthology', and there are some excellent bibliographical notes. The author is so obviously fitted for this kind of investigation that it is greatly to be hoped that he will follow up this admirable book with another one which will deal more particularly with the problems of the character qualities of groups, and whether these really do belong to the group organizations as such.

Emotion and the Educative Process. By DANIEL A. PRESCOTT. Washington: American Council of Education. 1938. Pp. xviii + 323. \$1.50.

In 1934 an American Council of Education formed the project of carrying out an informed survey of the present state of psychological and educational knowledge and opinion concerning the character and basis of emotion and its relation to various practical problems as they are met in schools. This is a full report of the survey as it has been effected. After a statement of the general and particular aims of the undertaking the book discusses in order: Basic Affective Phenomena; Physiological Bases of Affective Experience and Behaviour; Patterning and Trainability of Affective Behaviour; Affective Maturity; Basic Personality Needs and Conditions which Frustrate Them; Affective Behaviour and Contemporary Social Institutions and Processes; The Influence of Affective Factors upon Learning; Affect and Education; Aspects of Education Needing Study; Personnel Problems in Education. It presents a useful bibliography. As befits its aim the book is concerned not with the organization of original research and reports upon this, but with collating and constructively criticizing a large bulk of work already carried out upon the topics selected for special consideration. It does this very well, on the whole stating the present position fairly concisely and criticizing it with force and justice. Thus any reader interested in the general subject can from this book get a pretty good idea about the issues of much of the recent work, at any rate of the recent American work, on the problems involved. Where the report is somewhat disappointing is in its formulation of programmes for additional research. Many proposals are made, and though practically all of these are good and very much to the point, they are made in so general a way that they will be of little real use to the prospective research worker. In this field, as in many others in psychology, it is less difficult to formulate problems, or to see where lie the problems that it is most urgently desirable to investigate, than to invent feasible and practical methods of research. It is, for example, not of much help to say that the

whole concept of learning needs revision and "it is greatly to be hoped that this will be cleared up by the findings of penetrating research". The Committee has certainly done useful work in surveying the field and in showing where some of the main problems as yet inadequately solved are to be found. If now it would go on to suggest just how the methods of research that have been found most fruitful might be further developed, and to indicate new methods which could be applied with a reasonable hope of success, its work would be far more valuable still.

The Psychology of Early Growth. By ARNOLD GESELL and HELEN THOMPSON. New York: The Macmillan Company. 1938. Pp. ix + 290. \$4.00.

This is a guide book for the research worker who is interested in the controlled study of the growth of behaviour in young infants. It describes, illustrates and advises specific methods of investigation. It gives behaviour norms, maturity level summaries, a functional syllabus, and anthropometric norms. It presents principles of genetic analysis and shows how to achieve a clinical assessment of behaviour status. In appendices it gives many types of blank upon which the relevant material for this kind of study may be most conveniently entered. The whole provides a volume of intense interest and practical value to the research worker in this field, and it should certainly be in every psychological and educational library.

The Development of Linguistic Skill in Twins, Singletons with Siblings and Only Children from Age Five to Ten Years. By EDITH A. DAVIS. University of Minnesota Press, Institute of Child Welfare, Monograph No. 14. London: Humphrey Milford. 1937. Pp. x + 165. 9s. net.

Four hundred and thirty-six children, coming from various American schools, were set in what are called standardized situations, and the remarks they made elaborately analysed for articulation, length, number of words and other characteristics. The situations comprised the presentation of a considerable number of toys which the children were encouraged to play with. All remarks made were recorded. Sometimes remarks had to be encouraged by the experimenter. It is claimed that only children are superior to others in linguistic skill, and that twins are especially backward, though the disability of twins depends to some extent upon economic status. Many early language inferiorities are really connected with imperfect articulation, and if this persists various other disabilities are likely to arise. The monograph is clear and well written and provided the method is accepted the analysis made could hardly be better than it is.

The Adolescent. By ADA HART ARLITT. London: McGraw-Hill Publishing Co. 1938. Pp. ix + 242. 8s. 6d. net.

Dr Arlitt hopes that her book will help to stop parents from worrying unnecessarily about the vagaries of their adolescent children, and to understand and sympathize with them instead. Perhaps it will. Not a little of the terminology used, and many of the institutions and fashions referred to are American, but the English parent will probably find parallel illustrations which fit just as well without any difficulty. The general tone is sweeping and often dogmatic, and the parent who takes the whole thing very literally will have a lot to do, and will probably have to be well prepared to bear patiently or to rebut the charge of interference. It seems a pity that more specific evidence is not given for many of the statements made.

The Generations: A Study of the Cycle of Parents and Children. By EMANUEL MILLER. London: Faber and Faber. 1938. Pp. 276. 7s. 6d. net.

The topic of this book is the family. There is some study of its history, of its past and present functions and structure—mainly considered from a psychological point of view—of the individual demands which the family group has made and continues to make upon its members, and of its probable future. Moreover it is a good book which can be read by anybody who is sufficiently intelligent both with pleasure and with profit. It differs from a lot of books having a general interest in that it never descends to the level of offering cheap and popular advice. It is essentially a cool and careful study of the relevant facts, of methods available for their investigation, and of the main conclusions which the author considers may be regarded as established concerning them. Since the whole is based upon first-hand experience together with a thoroughgoing survey of authoritative investigations, it would have added to the value of the book if, when the latter are mentioned, the references to the literature had been given. But apart from this Dr Miller has produced a most readable, sensible and helpful book.

Psychotherapy. By PAUL SCHILDER. London: Kegan Paul, Trench, Trubner and Co., Ltd. 1938. Pp. 344. 15s. net.

This book is intended primarily to assist the physician and the psychiatrist in their approach to psychotherapy, though its description of psychotherapeutic method may be of considerable interest to the psychologist who does not intend to practise. The introductory material is difficult to understand, since it is linked to certain theories of the author's about the relation of the psyche to the 'body image'—theories developed in other books, but nowhere clearly stated here. However, what does emerge is the importance of considering the psychological symptoms connected with organic disease. There is a tendency to maintain, for instance, through the projection of physiological symptoms, the experience of health in conditions of severe organic disease. The nature of this tendency is related to the psychological make-up of the individual; and it is of great importance that it should be taken into consideration in diagnosis and treatment.

The main part of the book is devoted to a full and interesting description and discussion of the various techniques which the psychotherapist has at his command (discussion, free association, dream interpretation, etc.); and of the main psychotherapeutic systems and their application to different types of neurosis and psychosis. The author has developed an interesting method of group treatment, in which discussion, association and interpretation are carried out with as many as six or seven patients together. The method is said to be successful even with severe neuroses.

The book is suggestive and interesting, especially in that the author is not wedded exclusively to any psychoanalytic school. But his style of writing is disjointed, and his method of presentation, especially of the various types of neurosis, etc., disconnected and unmethodical; so that it is often a matter of difficulty to follow his line of thought.

Personality in the Depression. By E. A. RUNDQUIST and R. F. SLETTÖ. University of Minnesota Press; London: Humphrey Milford. 1936. Pp. xxii+398. 18s. net.

Both the personality and the depression referred to are American. A large number of employed and unemployed persons of both sexes filled up personal forms and recorded their views about a variety of topics on the Minnesota Scale for a Survey of

Opinions. A number of statements such as Times are Getting Better, or It is Difficult to Say the Right Thing at the Right Time, are printed. The patient is asked to record on paper, by underlining, whether he strongly agrees, agrees, is undecided, disagrees, or strongly disagrees. There are also a Moral Scale, an Inferiority Scale, a Family Scale, a Law Scale, an Economic Conservatism Scale, and an Education Scale. On the whole the unemployed differed from the rest most in their reactions (paper) to the economic order, and discontent with this appeared greater among men of the more lowly occupations, the least education, and among the older subjects. But probably the main value of this publication consists in its critical treatment of the methods used. These methods are given a thorough trial and are well analysed. They are found wanting in a number of specified respects, and as a basis for further research on *method* the monograph will be found useful.

L'Étude Expérimentale du Caractère: Méthodes et Résultats. Par N. BRAUNSHAUSEN. Vossegat: Centre National d'Éducation. 1937. Pp. 198.

The English reader who wishes to get a brief but clear account of many of the recent developments of characterology will find this book exceedingly useful. It gives first a general account of the development of experiments on willing, with sufficient detail to show up their methods and their main conclusions. There follows a really excellent description of the various typologies which have grown up in post-war days, especially in Germany. Then comes a study of the methods used in the investigation of more or less isolated character qualities, followed by a chapter dealing with the ways in which the study of somatic reactions may help to elucidate character and temperament. Finally various views, partly experimental, partly observational, on the general basis of character and personality and the interrelationships of their different aspects are set forth. Every chapter has a brief and clear summary, and in the end the whole position is carefully summed up. The author does not attempt to give an adequate account of work that has appeared in the English language, but his study of French, Belgian and German developments is very welcome. The bibliography also should be of great use to the English student. Throughout, a very sane attitude of appreciative criticism is maintained.

Charakterologie. Von PAUL HELWIG. Leipzig: B. G. Teubner. 1936. S. xii + 295. geb. RM. 8-60.

The English reader who desires a fairly brief and comprehensive study of modern German developments in what is called Characterology will be able to satisfy himself with this book. After rather a lot of general remarks about the aims and methods of the study of personal character, the author gives an excellent survey of most of the main typologies, continues with some account of psychopathology, summarizes the work of Klages, and considers the contributions made by psychoanalysis. He also discusses the more philosophical approach of Häberlins, and some of the by-products of the movement. There is exceedingly little sign of any influence coming from work done outside Germany.

Philosophie und Pädagogik Paul Häberlins in ihren Wandlungen. Von PETER KAMM. Munchen: Ernst Reinhardt. 1938. S. 479. M. 6-80.

Häberlins' philosophical and educational views are here expounded in a very appreciative manner by Peter Kamm. They are considered in the order of their development and the author sets them in a framework of four periods: (1) the period during which the basic religious concepts which underlay all the later developments

were forming (1907-8); (2) the period during which Häberlins was more immediately concerned with the idealistic and moral implications of his ideas (1910-25); (3) the period of the full expression of his religious philosophy (1926-32); and (4) the period in which theoretical philosophy formed the main pre-occupation (from 1932). Throughout stress is laid upon the educational significance of the views expounded, and the final section of the exposition deals explicitly with the pedagogical writings of 1935-6. A portrait of Häberlins is included and a full bibliography of all his published works.

Science and Psychic Phenomena. By G. N. M. TYRRELL. London: Methuen and Co. 1938. Pp. xv+379. 12s. 6d. net.

The student who desires to find in one book a fairly detailed study of most of the types of problem which have been investigated in the name of psychical research could hardly do better than consult this volume. Mr Tyrrell considers, with abundant illustration, the case for different kinds of 'spontaneous evidence', both outside and inside the laboratory; he discusses possible physical explanations of the alleged facts and cautiously rejects them; he passes in review the evidence concerning many different kinds of trance phenomena. While in the end he says frankly, "I do not think that we can point to any fact in psychical research to-day and say that it is universally accepted, unless, indeed, we regard hypnotism as being a psychical phenomenon", he considers himself that the evidence for extra-sensory perception, incapable of explanation in physical terms, is practically convincing, and that the case for the "existence and communication of the surviving self-principles of deceased persons is strong". He suggests hypothetical explanations.

Psychology and Religion. By C. G. JUNG. New Haven: Yale University Press; London: Humphrey Milford. 1938. Pp. 131. 9s. net.

This book is based upon a series of lectures delivered at Yale University on the Terry Foundation. Prof. Jung is concerned to relate together religion, defined as the experience of the 'numinous', and the functioning of the collective unconscious. The latter is illustrated in particular from a long series of dreams of a certain neurotic patient, which contained symbolisms characteristic of the occult religions, such as Gnosticism—symbolisms quite unknown to the patient's conscious mind. These culminated in the visual impression of a 'world clock', producing in the patient "an impression of the most sublime harmony". From this and from many similar 'mandalas' produced by patients, Prof. Jung concludes that the religion of man is no longer based on the projection of the 'numinosum' upon an external and autonomous deity, but upon the idea of the complete man; "the unconscious produces a new idea of man deified or divine, impersonal, concealed, protected, usually dehumanized and expressed by abstract symbolism".

It is impossible to give in such a brief account any idea of the subtlety and profundity of Prof. Jung's argument, which requires close and detailed study. It will be unfortunate if the excessive price of this book prevents many who would otherwise do so from studying it for themselves.

Die geistige Wiederholung. Von F. A. VAN SCHELTEMA. Leipzig: Bibliographisches Institut AG. 1937. S. viii+294+xxxii. M. 5-80.

Dr Van Scheltema's new book may be called a study in comparative anthropology, or, using the words in the old sense, in genetical psychology. Its general object is to trace the ways in which the same motives, technique and material appear again and again in cultural periods which are widely separated in space and time. Most of its pages are devoted to a study of artistic expressions as revealed in the works of ancient

times and that of contemporary child drawings. But a good many other departments of culture are touched upon as well. A general parallel is drawn between culture development and individual development, and attempts made to state in what respects the two run along similar lines and in what respects they differ. The volume is well illustrated by 32 pages of plates.

Theodor Elsenhans Lehrbuch der Psychologie. Herausgegeben von HANS W. GRUHLE und F. DORSCH. Tübingen. 1938. S. 241-400. RM. 6.30.

Elsenhans's text-book, fully revised from the third edition by Prof. Fritz Giese, is being issued in parts by J. C. B. Mohr (Paul Siebeck) of Tübingen. This particular part deals, in a rather general way, and with critical and expository references, with many of the main theories of perception, thinking and feeling.

Deuxième Congrès International d'Esthétique et de Science de l'Art, Paris, 1937. T. I et II. Paris: Félix Alcan. 1937. Pp. lxiii + 369; 527. 120 f.

General introductory and laudatory orations were delivered by MM. Paul Valéry, Paul Claudel and Victor Basch and these are here printed in full. Fairly extensive summaries are given of the numerous other contributions, and these are arranged under the following headings: General Aesthetic; Psychology, analytic (i.e. more or less experimental) and general; Sociology and Culture; History and Criticism; the Science and Technique of Art, and Contemporary Art. Every reader who is interested in problems of artistic production and appreciation will find something to attract and intrigue him. Work from twenty-three different nations is represented. The volumes are published under the general direction of the Association pour l'Étude des Arts. Most of the psychological contributions are concerned with some problem or other closely related to the emotional life, and a good many of them show some leaning towards psychopathological theories. As would be expected, they display a considerable diversity of opinion and conclusion, and in these ways they are undoubtedly stimulating and can be utilized to suggest many lines of work.

La Philosophie de Heymans. Par T. J. C. GERRITSEN. Paris: Félix Alcan. 1938. Pp. 299. 50 f.

Many English students must have found their way to the University of Gröningen at some time or another during the long period when Heymans held there the Chair of Philosophy and Psychology. To these, all of whom probably remember a kindly reception and stimulating companionship, this book will be welcome, and doubtless to many others as well. It deals, indeed, only with Heymans' philosophy, and that is a pity, for his psychological work, which was attractive and influential, is still less well known than it deserves to be. M. Gerritsen deals in turn with Heymans' theory of knowledge, his ethics, his aesthetics and his metaphysic, and in each case his expositions are clear and appreciative. The book concludes with a bibliography of Heymans' published writings.

The Pendulum Swings Back. By MARVIN M. BLACK. Nashville: Cokesbury. 1938. Pp. 229. \$2.00.

The 'swing back' to which the title of this book refers is a recoil from mechanism. In his foreword Prof. Ellwood says that the author presents "a synoptic view of the results of all the great sciences which are antecedent to the sciences of man and of

human society". Actually there is not very much about these antecedent sciences, for the bulk of the book is directly concerned with psychology, psychic research, medicine, social philosophy, journalistic education and cultural anthropology. In so far as biological problems are discussed, they are for the most part closely related to human affairs. The book may be useful as a kind of summary of what non-materially minded investigators and thinkers are saying about human problems, especially in regard to their social significance. But it is not very easy or attractive to read. There are far too many extremely summary references to most varied authorities, from which no reader who does not know already a good deal about their work will be able to gather very much. The general tone also is somewhat dogmatic.

A Biological Approach to the Problem of Abnormal Behaviour. By

MILTON HARRINGTON. Lancaster, Pa: The Science Press. 1938.

Pp. 459.

Dr Harrington believes that "the psychopathology of the future must be mechanistic not motivistic", and that everything must be built upon a physiological foundation. His basic tenet, he says, is that behaviour "is due to the action of an anatomical structure or mechanism of some sort, and that abnormal thoughts, feelings and actions are due to the limitations and defects of this piece of mechanism". Part I discusses First Principles and does very little more than assert this position over again in very general terms. Part II is called Psycho-Physiology. A large number of different topics are dealt with here, from a consideration of very simple forms of behaviour to that of very complex intellectual, emotional and sentiment reactions. The effort all the time is to sketch a general physiology of the neural and other conditions upon which each form of conduct that is being dealt with may be regarded as based. The assumption is that the assigned physiological basis is also a veritable cause. Much of the discussion will be found interesting and helpful by anybody who has a sufficiently good physiological background to read critically. But of necessity many of the 'basic conditions' considered are described only in an extremely vague and general manner. Again and again very little is done except to translate what is known directly in terms of the description of gross observed behaviour into terms of what is suspected from the physiological study of reactions vastly simpler than those which are being considered. Part III concerns Psychopathology. Here once more the discussions are of a general kind concerning *principles* of defective functioning rather than specific cases.

Most readers will probably feel that as a scheme for an approach to the study of problems of behaviour this may be all very well. They will find also that if they try to express all their particular problems in specific terminology consistent with the scheme they will often be baffled and have to resort to much speculation. As an attempt to develop an orientation and to guide research the book has much to be said in its favour. As a statement of anything in the least final in the way of theorizing it is unsatisfactory. Moreover it is much too long.

Identité du Monde et de la Connaissance. Par GEORGES MATISSE. Paris:

Félix Alcan. 1937. Pp. 256. 35 f.

A tremendous number of problems are attacked in this book, but always with vigour and with grace. In fact very nearly the whole mechanism of the mental life, from sensations, both exteroceptive and proprioceptive, through affect and emotion, to perception in all forms and the higher developments of the reasoning processes, is passed in review. Also the author has much to say about aesthetic reactions and about many kinds of mysticism, especially those which have been connected with religious beliefs. In general his aim is to decide which of all these processes give reasonable and more or less well attested knowledge of nature, and which represent

rather by-paths of exploration and the pursuit of extremely attractive but romantic problems. The volume will admirably serve the purposes of the reader who wants to be stimulated, amused, interested; as a serious scientific contribution to psychology it is not satisfactory. But then it does not pretend to be this.

L'Alternative. Par VLADIMIR JANKÉLÉVITCH. Paris: Félix Alcan. 1938. Pp. 219. 30 f.

All life and every moment of it is *Alternative*. With plenty of decorations and variations this theme is played throughout the first half of the book. There is no escaping alternatives in their many forms, but it is very interesting to know something of how they arise, and in general they can be borne, and even mastered, if only the patient man is sincere. The second part of the book deals with the metaphysic of boredom. Boredom also is pretty nearly a universal lot. The only thing to do about it is to face it squarely and to learn that every minute has its peculiar worth and excellence. "Les hasards charmants naissent et se fanent dans toutes les allées, il ne faut pas bâiller pendant ce temps-là."

Social Interest: A Challenge to Mankind. By ALFRED ADLER. London: Faber and Faber. 1938. Pp. 313. 10s. 6d. net.

A number of related essays or lectures on a variety of topics by the late Dr Alfred Adler are here presented to the public. By the person already familiar with Dr Adler's work the book will not be found to contain any new ideas, but it gives many excellent, clear and concise summaries of his views, and some new case material.

The Voice of Experience. London: Herbert Jenkins, Ltd. 1938. Pp. 203. 5s. net.

The publishers modestly remark that "The Voice of Experience" is a "psychologist whose knowledge of human nature is unequalled throughout the world". This Voice here purports to tell everybody how to be extremely happy. The book is costly.

